I/O News

Software Review: ProCall

TeleMaster & The Knowledge Index

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THE OFFICIAL PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF CROMEMCO USERS

Volume Four, Number Three

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Cromemco Introduces Intelligent Communications Controller For Unix System V Computers

Cromemco just announced a new communications controller, called the BIART, for SNA, X.25, and other high-performance serial communications protocols. The new controller board works with the recently-announced UNIX-based computers, Cromemco's System 100 and System 300 series, as well as with the company's other multi-user machines.

The new controller allows Cromemco computers to communicate with other computer systems, such as would be required when accessing large databases on mainframe computers, and to do so with flexibility with regard to the protocol that is used.

The SNA networking architecture is the most popular way of connecting distributed computers to an IBM mainframe and is especially useful for high speed data transactions. The X.25 protocol is used for interfacing to the Tymnet networking architecture, which provides packet switching for low cost communication in a public data network.

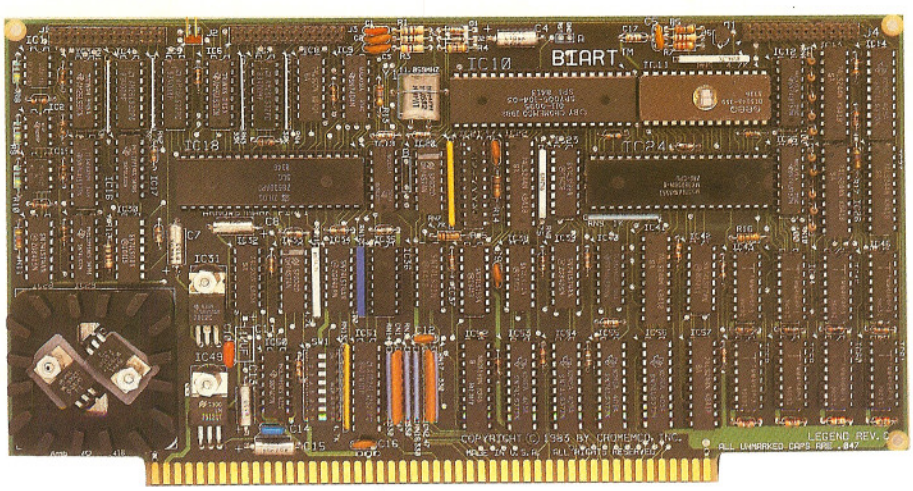
The BIART is a two-channel serial interface with an I/O processor included on the card. Supporting three serial protocols, the BIART can handle bit-oriented synchronous communications, such as SDLC, byte-oriented synchronous communications, such as BISYNC, or asynchronous communications using ASCII or other codes. A parallel interface channel is also included.

The parameters of each serial channel are set by software; this includes the serial mode (asynch, bit-sync or byte-sync), baud rate, automatic echo control, loopback mode, and modem control state. Each channel also supports the three EIA-standard interface levels: RS-232 and RS-423 for moderate transmission speeds and distances and RS-422 for higher performance.

The BIART is an intelligent card with its own microprocessor. This processor can handle all of the protocols without affecting the performance of the overall system. This design technique, using distributed processing throughout the system, is a characteristic of Cromemco computer designs. In fact, the processing power on the BIART board, used strictly for the BIART operations, is greater than that contained in some stand-alone computers.

The microprocessor on the BIART is used for buffer control, error checking,

Continued on page 16



Conversion of the C-10 for Working from Right to Left

by Uri Chamish

The languages used in Israel, as in the Arab countries, are customarily written and read from right to left. Most of the remainder of the developed world reads and writes from left to right. So, it is no surprise that the standard interface on virtually all computers is structured for the way most users are accustomed to reading and writing.

There are more differences than just reading and writing. The key allocation on a Hebrew keyboard is totally different. Although programmers generally do not see any practical advantage to translating programming languages into Hebrew, preferring to use existing languages in their English forms for writing programs, they like being able to test the results by running the programs

Continued on page 16

UNIX Q & A (Part II)

by Dr. Roger Melen

EDITOR'S NOTE:

In response to the flood of questions that arose when Cromemco announced its entrance into the UNIX world, Dr. Roger Melen, Vice-President and co-founder of Cromemco, Inc., prepared a list of commonly asked questions, along with his answers. This, the second segment of a two-part article, concludes his comments for the moment. We invite users of UNIX-based Cromemco systems to send us their questions or experiences so that we can provide more articles on this important subject.

18. The system price includes UNIX V and CROMIX software, but the only software documentation provided is the on-line manual documentation. Why aren't the software manuals included with the system?

The software manuals are priced and available separately because there are

Continued on page 16

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Location of Directories (B: Z:) — can be specified in another environment file (.profile) using **full 128 byte Cromix path names**. A default directory (/lib/ovr) is always searched after the specified directory if a file is not found.

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July/August, 1984 Volume Four, Number Three

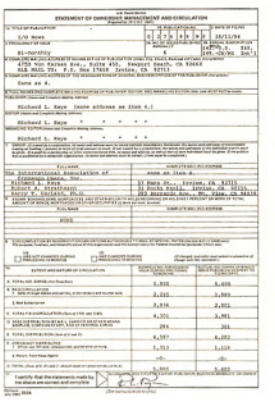
I/O News

The Official Publication of The International Association of Comemco Users is available through membership in the association. Editorial and advertising policies are designed for the enlightenment of the members in regard to new uses for, and developments of, Cromemco products and other products compatible with Cromemco systems.

COVER FEATURES

ARTICLES & FEATURES

DEPARTMENTS



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input...

ST-506 and the STDC

Editor:

This letter is to inform you of some misinformation contained in a recent issue of I/O News concerning the interface board. In the first paragraph of the front-page article, it states that the STDC can be used to drive any industry-standard ST-506 type of hard disk. This is not so.

I run a small engineering consulting firm and use a Cromemco system. Recently I decided to add a hard disk. Based on Cromemco's product description and the I/O News review, I purchased an STDC and a Seagate ST-506 drive, the drive that originally defined the ST-506 interface. I installed them and they did not work.

After a little troubleshooting, I discovered that the STDC violates the seek timing specification as described in the Seagate ST-506 OEM manual. I have tested the STDC with other drives and apparently it will control a voice-coil type drive, but will not work with some stepper-motor type drives. I informed Cromemco Technical Support and provided them with a Seagate drive and documentation. They assured me that they would look into the problem. Two weeks later they contacted me and told me that the STDC does not work with the ST-506 drive [I sent them]. Furthermore, they would not make it work, nor would they assist me in making it work.

I am currently in the process of patching the firmware to handle the ST-506 drive correctly. If any of your readers have found themselves in this situation, I will be willing to share the patches when they are completed.

Thank you for your attention,
Curt Johnson
Sacramento, CA

Dear Mr. Johnson:

Thank you, on behalf of several members who may encounter similar problems, for bringing this to our attention. One of the peculiarities in this situation is that not all "industry-standard ST-506" drives are, in fact, industry-standard.

For instance, Seagate's older drives [like the one you are trying to use] utilize the older ST-506, while their newer drives actually utilize ST-406. The difference is that the older drives do *not* have buffered steps, while the newer drives do.

Also, there seems to exist a rather cavalier use of the generic term "ST-506" within Silicon Valley. According to one source, "just about anything that fits in a five-inch box" is referred to generically as ST-506. That's pretty loose, we admit. Nonetheless, we do not consider ourselves forgiven for misleading you — and quite possibly others — by the offhand way we handled the subject in the article you criticized.

Two items can impact use of the STDC. The first is a listing of the nine drives successfully tested by Cromemco. This listing appears in Appendix C of the STDC manual. Among those listed is the Seagate ST212, that company's current offering. Obviously, the model you attempted to interface is older.

The second item deals with how to convert a non-buffered step drive so that it conforms to the new wave of drives, all of which have buffered steps. The solution, it turns out, is quite simple, and takes place within the operating system, whether it be CDOS, or CROMIX.

All that is required is a short program which one can write in Assembly, 'C', BASIC, or whatever, and which becomes part of the startup command. It involves calling the operating system with the setmode call, as suggested below:

Step 1: open /dev/std0
Step 2: set up to do another call — use channel number from open call
Step 3: use mode type of 0
Step 4: use new value of 0
Step 5: use mask of 40H
Step 6: Call operating system for setmode

What this does is change the mode from whatever it was to zero. By so doing, buffered steps become recognized.

Again, our thanks to you for pointing out our treatment of this subject in the original article. We hope the simple solution offered here helps you and others.

Ed.

C-10, WriteMaster & an Epson Printer

Editor:

I have encountered difficulty with use of the SCREEN Editor under CDOS on my C-10, and the batch utility in the situation described.

Specifically, I have created several programs using SBASIC to program my Epson MX 100 printer for double-strike, italics, etc. These programs are stored on a disk that is usually put into Drive B. The disk also contains the printer.com program used to select the type of printer. When I use the C-10 for word processing, either WordStar or WriteMaster is on the A Drive. After booting and exiting from the main menu, I will call up the printer.com on Drive B, select the MX 100, and then the appropriate program for the type of printing.

Instead of the above, I attempted to create (through the use of the SCREEN Editor on Disk B) a command file that would be stored on the disk with the BASIC programs for the type of print. I made this attempt with the use of the following program:

printer.com
sbasic os (selection of double strike print etc.)

After the file is saved, it will select the printer menu and the appropriate BASIC program. Any attempt to have this batch program run WriteMaster on the A Drive was unsuccessful. No matter what command I tried, the C-10 would search for WriteMaster on A and then print out an error message that the Messenger File (Writm067.hlp) is not available and WriteMaster aborted. Then the menu on Drive B would be displayed.

Any help you can render will be appreciated.

Yours truly,
Craig M. Nisnewitz
Rego Park, NY

Dear Mr. Nisnewitz:

The problem you noted has to do with making Drive B the "default" or "current" drive under CDOS. I reach this conclusion because you say that the menu on Drive B is displayed after WriteMaster aborts.

As I understand it, you wish to have your wordprocessing done on Drive A, i.e., to have a wordprocessing disk containing the programs and text files on Drive A, and the menu, printer, and SBASIC programs on Drive B. This is all well and good. The problem is that, although you can access WriteMaster on Drive A from Drive B, by using the drive specifier "a:" as part of the program name (such as: "a:writmast"), WriteMaster expects the associated .HLP and .TAB files to be present on the "current drive." This would be Drive B in the situation you described.

The solution to the problem is, therefore, quite straightforward. All that need be done is to put copies of the .HLP and .TAB files on the disk in Drive B, along with your batch file.

You can then call WriteMaster on Drive A from your command file by addressing it as "a:writmast." When you go to edit a file on Drive A, use the drive specifier "a:" as part of the name of the file.

Thanks for writing and I hope this helps.

Bill Jaenicke
Technical Editor

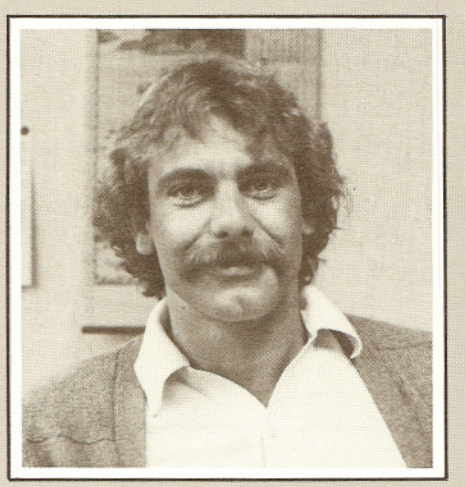
The 32/16-bit World

Since before the introduction of the MC-68000 microprocessor, a lot of glowing promises were made as to what the 68000 series would mean to computer users. The truth is, software development for the 68000 has been slower than anticipated throughout the industry. Suddenly, it appears that the glowing promises may come true.

One of the biggest impediments to software development has been the lack of a clear path for the developers. Now that Bell Labs has released UNIX System V, that path is taking shape. A "standard" finally exists. UNIX System V may be to the 32/16-bit world what CP/M is to the 8-bit world.

We recently attended a UNIX show at the Los Angeles Convention Center where the impact of a standardized UNIX began to become apparent. While there, we discovered two software offerings that bear mentioning. The first is a development of a company called Soft-

output...



Bill Jaenicke

ware Manufacturers, Inc. [SMI]. It is a translator which converts software written in various BASIC dialects to 'C' source code. Called S-TRAN, the translator is menu driven and allows program maintenance to continue in BASIC, or the software writer can update in 'C.' S-TRAN works with another utility called C-LINK which is a 'C' application generator.

What this means to software developers from the BASIC world is a means of easy entry into the UNIX world, and transportability within the UNIX world, once entered. At the mid-September show, we learned that S-TRAN is currently available for Microsoft and Oasis BASICs, and is under revision for Cromemco's 32K Structured BASIC. Ed Fearon, of Computer Crossroads in Richardson, Texas, has undertaken the 32K revisions and reports that the modified product will be ready for release about a month after you receive this issue.

The other software offering that attracted our eye is a similar product, only this one translates FORTRAN to 'C' source code. That's about all we can say about it for now, but we hope to get further information as the product matures.

The point is, things are beginning to happen. And when that occurs, the history of the industry indicates that we can expect a "snowball" effect. Let's hope so.

Cromemco & CAD

Another show recently held in our locality was *Auto-Fact* [for Automated Factory], a CAD/CAM exhibition. We were there to see the people from Microcad, the contributors of an article in Vol. III, No. 3. That article attracted a great deal of interest among our readership. Unfortunately, many of the responses were routed to an incorrect address in Israel, as the company was then in the process of moving.

Meanwhile, Microcad, or M.CAD as the software is now called [the company is Microcad, Ltd.], has been maturing to become one example of the emerging UNIX programs referenced above. Originally designed for mechanical engineers, the product now offers remarkable versatility. Based on a centralized module that provides the operating environment for all CAD/CAM applications, M.CAD offers the following utilities:

1] a geometric database manager that stores and maintains a hierarchical description of the product being designed in the form of mathematical models;
2] an associated properties processor that stores and manages non-graphic data associated with the design—used to control the flow of data between the different phases of design and manufacturing; and
3] an interaction processor providing the basic elements of the man/machine dialogue through the use of a high-performance graphic subsystem, a graphic input device [mouse], and sets of on-screen menus and prompts.

In other words, M.CAD has really grown up. In a recent conversation with Dr. Roger Melen, [Cromemco co-founder], he pointed out that M.CAD can not only design products for a plant to manufacturer, it can store data and graphic sets related to the plant itself. For instance, before breaking through a wall to expand a building, or modify office configurations, it is ideal to know what wires, pipes or footings exist out of view—and exactly where. M.CAD stores the data and the graphics associated with the hidden parts of a structure and, on command, can provide a 3-D model. A handy little program to have around, eh?

The re-emergence of M.CAD brings to three the number of superior CAD-type programs available to run on Cromemco systems, either under CROMIX, UNIX, or both. I refer to SPICE, the pre-eminent circuit design software; SCADA; an outstanding set of programs for structural engineers; and now, M.CAD.

The nice thing is, one could run all three on a little ol' CROMIX/UNIX microcomputer. Wow! And we remember when 64K of RAM and an 11 Mb hard disk were considered state-of-the-art. How times do change.

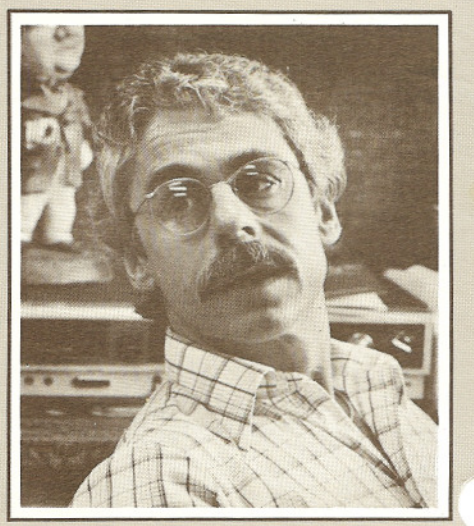
For the convenience of those interested in various aspects of CAD/CAM, we include contact addresses for the products mentioned:

M.CAD: Microad, Ltd.
5, Ausishkin Street
Ramat-Hasharon 47210
Israel
Phone: 034-90702

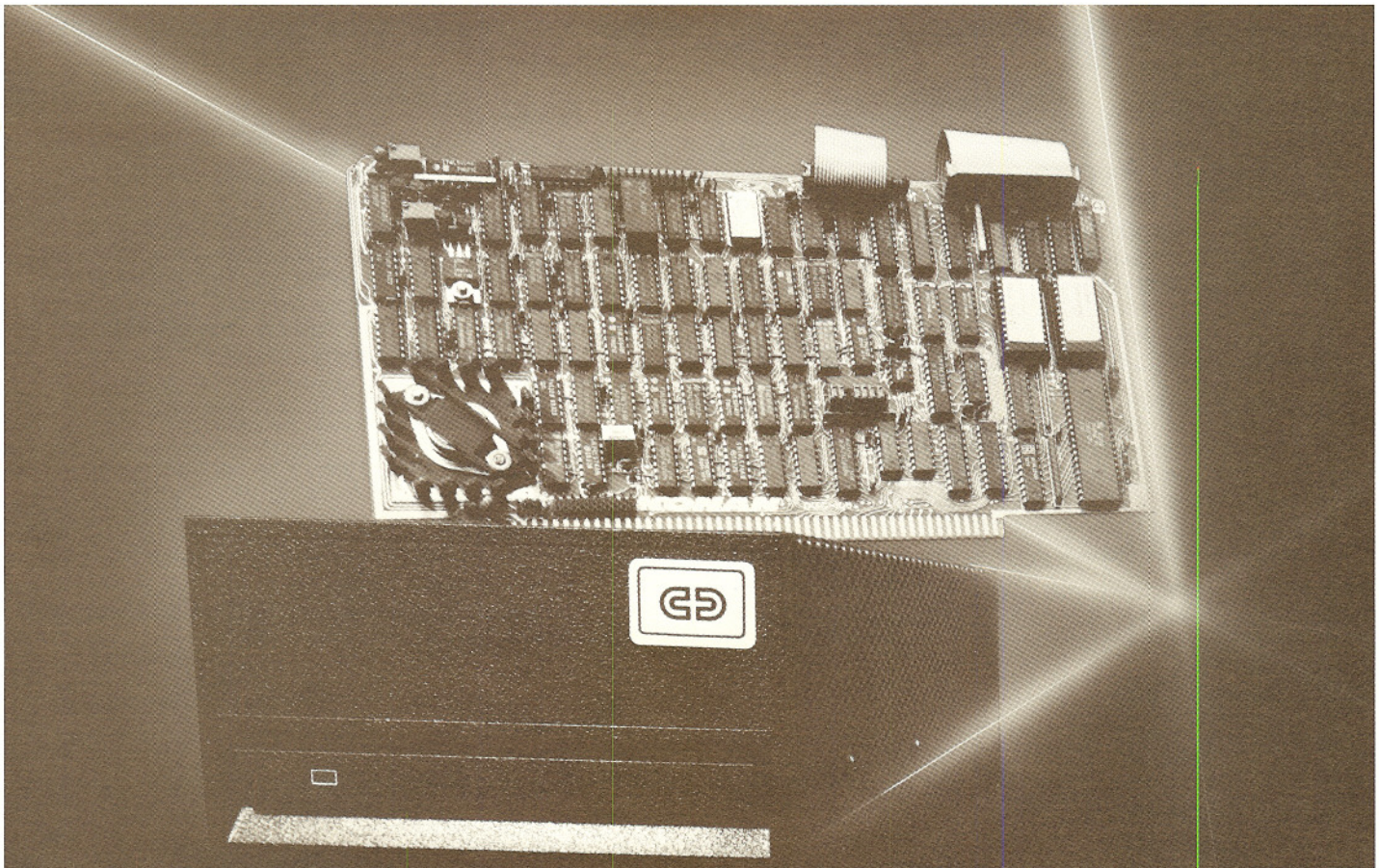
Microdad, U.S.A.
181 Brewster Road
West Hartford, CT 06117
Phone: 203-233-3677

SCADA: American Computers & Engineers
2001 South Barrington
Suite 204
Los Angeles, CA 90025
Phone: 213-477-6751

SPICE: The Cromemco version is available from Cromemco dealers, world-wide.



Richard Kaye
Editor



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TeleMaster and the Knowledge Index

Mary Ann Robertson

How many ways are Cromemco computers used by industry? One way to answer this question is to do a literature search using "Cromemco" as a key word, and one of the best systems to use is the Knowledge Index.

The Knowledge Index

The Knowledge Index is an online information searching service available to people with microcomputers. It includes about 23 databases of the more than 170 offered by the Lockheed DIALOG Information Retrieval Service.

The databases fall into the following areas:

Agriculture
Books
Business Information
Computers & Electronics
Corporate News
Education
Engineering
Government Publications
Legal Information
Magazines
Mathematics
Medicine
News
Psychology

The system is accessible during non-business hours (after 6 PM until 5 AM the next morning, Monday-Thursday; 6 PM to midnight Friday; 8 AM to midnight Saturday; and 3 PM to 5 AM the next morning on Sunday).

Subscribers to the Knowledge Index pay a $35 startup fee which gives them a User's Workbook, 2 hours of free search time, the quarterly newsletter *(Knowledge Index News)*, and telephone support. All system usage is charged to a valid credit card number.. The cost after the first two free hours is $24 per hour of connect time. This includes use of the system and use of the communications network. (If you were to access one of the databases through DIALOG during the day, you would pay a specific connect time for the database, a network connect charge, and probably a charge per record printed on your CRT. The INSPEC database, available as COMP1 through the Knowledge Index, costs $85 per hour and 25 cents per record printed on the CRT. There would be an additional charge for the use of Tymnet, Telenet or Uninet.)

I have run over 20 search sessions in the past year for a variety of topics, ranging from the appearance of the word "Cromemco" in each of the databases, to identification of UNIX application software. The search approach is through key words selected by the searcher rather than from some specific list. Words can be combined in various ways by "and'ing" or "or'ing" them together; and words can be excluded by using "not." The various methods are described in the workbook.

I use TeleMaster on the C-10 with a 1200 baud modem (the connect line is straight time, independent of communications rate, so the faster the better; you get more for your money at 1200 baud).

The following steps will ensure that you have a successful search.

Equipment

C-10, preferably with two floppy drives
1200 baud modem (MDM-1200 or Bytcom 212AD)
Telephone
TeleMaster diskette
Empty diskette for saving search results

TeleMaster

TeleMaster should be set up to use the modem at 1200 baud. I put the access phone number (I use TeleNet) into TeleMaster's phone book and have it dial for me. After you get onto the communications network, you need to connect to the Knowledge Index (following User's Manual direction). For TeleNet, I get an "@" prompt on the screen and type

c 41548K

Then I type in my account number and passwork to log on.

After I've logged on, I set up a TeleMaster file to capture whatever comes across the screen:

SHIFT^Q	get back to TeleMaster menu
2	Display File Transfer Menu
6	Record into a C-10 disk file

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b:<filename> name a file on Drive B

TeleMaster will then return to the Knowledge Index and you can begin the search. Periodically, TeleMaster will write the information which has been shown on the CRT to the file you named above. No information will be lost during this period because a "stop command" will be sent to Knowledge Index until the file is written. (If you type **SHIFT^Q** during the session, TeleMaster will close the file you've been writing. You'll then need to set up a new one with a different name.)

The Search

To begin a search, you need to choose the database which is most likely to have the information you are looking for. For computer information, there are several useful ones:

- COMP1 (INSPEC) mainframes, electronics, physics
- COMP2 (International Software Database) software only
- COMP3 (Microcomputer Index) BYTE, Dr. Dobb's, InfoWorld, Interface Age, Microcomputing, Personal Computing, etc.
- COMP4 (The Computer Database) "the trades" such as Computer Systems News
- CORP1 (Standard & Poor's News) interim and annual reports, news releases
- BUSI1 (ABI/INFORM) business periodicals such as Fortune, Business Week, Advertising Age, Marketing News, Sales & Marketing Management, Computer Decisions, Computerworld
- BUSI2 (Trade and Industry Index) brief citation of press releases, trade journals
- NEWS1 (Newsearch) complete text of recent press releases (up to 6 weeks), daily issues of *New York Times, Wall Street Journal,* and *Christian Science Monitor*
- News2 (National Newspaper Index) the above newspapers since 1979

The government indexes (for National Technical Information Service and Government Printing Office) are occasionally useful as is Books in Print. The engineering index (ENG1) is useful for vertical engineering markets (civil engineering) but duplicates much of the computer information in COMP1.

The Knowledge Index User's Manual tells how to do a search. Here are the general steps:

begin <database>
Select the database; system will type some information and then give prompt, "?"

find <keyword>
Use your major word first; the system will give a label, such as S1, the number of entries and the keyword.

find <other words>
Other words of interest; the system will give the next numerical label, such as S2, the number of entries, and the word

find <S1 and S2>
Find all citations which have both the word in S1 and that in S2; the system will give the next numerical label, such as S3, the number of entries, and "S1 and S2"

The Knowledge Index finds the citations very, very quickly. The time spent is that of "printing" them on the CRT. This is done with the **display** command. The most recently published ones are given first. Do the following to list them onto the CRT:

d <selection number/long/citation n to m>

or more precisely,

d 4/1/1-5
Display S4 in the long mode, entries 1 through 5

The system will type these out giving a citation number, a title, authors, journal information, and an abstract. You will be able to find your search **words** if you look carefully. (Sometimes you find something you are **not** looking for because of the way the words are joined. I was looking for information about the computer timesharing market and found vacation rentals!)

If you forget your search strategy, you can type

recap
The system will identify the database and list the label numbers, numbers of entries found, and search words

When you want to change databases, you select a new one with

begin <database>

You must create your strategy over again, however. There is no way for Knowledge Index to save it.

If you are curious about how much the search is costing you, type

cost
The system will print the time and current charges

When you are ready to quit, type

logoff
The system will print the date, time, total session time, and cost with your number and then will disconnect you.

You may have to disconnect your modem manually. Close your TeleMaster file by typing

SHIFT^Q
TeleMaster will close your file.

Now What?

Now you want to print out what you've saved. I use the System III under CROMIX to do that but I do a little preliminary work first. The Knowledge Index system inserts **^Q** when it asks a question. It also places **^J** at the start of

each line. I take care of all of this with Screen.

Bringing the file into Screen strips out the ^J automatically and I use a global substitute to get rid of the ^Q's:

```
100 s /^Q///
```

Substitute 100 times the ^Q with nothing

I do it in groups of 100 just to have something to do occasionally. An hour's search may produce a 96K file, so it will have a few hundred ^Q's, depending on how many groups of citations were printed.

After completing Screen, you'll want to print the file. If I want it fast, I use a dot matrix; if I want it pretty, I use a slower, letter quality printer.

Here are some statistics on example searches:

Hours	Cost	No. Bytes	Pages
0.307	$ 7.37	47K	21
0.342	8.21	57K	24
0.652	15.66	83K	32
0.586	14.06	106K	42
0.980	23.52	158K	61

The dot matrix printer takes about 20 seconds per page and thus a 47 page file takes about 15 minutes to print.

Results of a Search

At the beginning of this article I mentioned using "Cromemco" as a search term. The day I did the search, the agriculture database was not available. Out of the other databases I found 162 citations containing the word "Cromemco" (plus 124 others in the Software database). Here is how they were distributed:

BUSI1	16	ENGI1	3
BUSI2	4	GOVE2	7
COMP1	47	MAGA1	11
COMP3	47	MEDI1	1
COMP4	18	MEDI5	3
EDUC1	4	PSYCH1	1

In listing the citations, I found some interesting uses of Cromemco computers: a controller of spectrometer parameters for investigating vapor composition above alkali carbonate metals (!); a brain stimulation system; a system for performing videodensitometry measurements from videotape recordings of medical diagnostic images; and a computer assisted instruction package for teaching BASIC to Air Force personnel.

The Knowledge Index teamed with the C-10 and TeleMaster is an excellent research tool.

For further information about TeleMaster, contact Cromemco. For information about the Knowledge Index, contact:

DIALOG Information Services, Inc.
KNOWLEDGE INDEX Service
3460 Hillview Avenue
Palo Alto, CA 94304
(800) 227-5510 or (415) 858-3796

Happy searching!

CHANGE OF ADDRESS

Membership # _____

Type or Print

Your Name _____

New Address _____

New area code
& phone No. (___) _____

Sign Here _____

Date new address in effect _____

Send address changes to I/O News,
P.O. Box 17658, Irvine, CA 92713.

ProCall Modem Communications System

by Greg Pepper

Product: ProCall Modem Communications System
Producer: ProtoMatrix Software Development, Sunnyvale, California 94087
Price: $349 (S-100 version); $195 (C-10 version)
Note: ProCall was tested on a Cromemco C-10 (release 5) and on a Cromemco System Three running version 20.63 of the 68000 CROMIX Operating System.

Introduction

ProCall is a powerful all-purpose communications package, designed specifically for Cromemco's line of computer systems. By running the ProCall program on your computer, you can log on to another computer from your C-10 or from a terminal connected to your S-100 computer. You can also use ProCall to transfer files and programs, sending them to the remote computer or receiving them from the remote computer.

The ProCall program permits a wide variety of hardware configurations: a C-10 or S-100 system can communicate with a remote Cromemco or non-Cromemco system, either using modems or connected directly by a serial cable.

There are two versions of ProCall, one for the C-10 personal computer and one for Cromemco's S-100 systems (running either CDOS or CROMIX). The two versions are nearly identical in operation; minor differences reflect the effort that was put into optimizing each version for the hardware it runs on.

The Package

The ProCall package includes the distribution diskette (5¼" and 8" available for CROMIX, 5¼" available for C-10), the ProCall Installation and User's Manual, and a function key strip. Software on the distribution diskette includes the files PROCALL.COM, PCMOD.COM, and PCXFER.COM.

The file PROCALL.COM contains the ProCall program itself. It will be described in detail in the following sections.

PCMOD.COM is a menu-driven program that allows the user to customize the ProCall program by selecting default values for a wide range of features. These include six user-definable function keys, and separate character translation tables for the CRT, keyboard, printer, and RS232 port.

The PCXFER.COM file is necessary if you are using ProCall to transfer files (ASCII or binary) to or from a computer running the CROMIX Operating System. In this case, the file PCXFER.COM must first be placed in the /BIN directory of the remote CROMIX system. Files may still be transferred to another system, even a CROMIX system, without using the PCXFER program, but the use of PCXFER allows maximum speed, convenience and reliability. Also, transferring binary files can only be done with PCXFER.

The diskette for use with S-100 systems contains two additional files: PROCALL.HLP, which can be placed in the /USR/HELP directory of a CROMIX system, and INSTALL.CRX, which can be used to install the ProCall software on a CROMIX system.

Documentation

The ProCall Installation and User's Manual is complete and well-organized. Most of the manual is devoted to a complete description of all the ProCall commands, arranged alphabetically. The introductory material contains material necessary for installing and running the software, plus an excellent section of examples dealing with command-line options. In the back there is a glossary, an index, and numerous appendices detailing a variety of helpful technical information.

In addition to the manual, the ProCall program contains a well-organized menu display that lists the commands (grouped by function) and the code used to select each command. Once you have an initial understanding of what the commands do, this menu allows you to use the program quickly and easily without having to refer to the manual at all.

Also, the menu display can be bypassed, if you know what command you want to give. This feature represents an elegant and effective solution to a common software design problem: how can one program satisfy the needs of both the inexperienced user and the advanced user?

Installation

For C-10 ProCall, software installation is relatively straightforward: the program can be used simply by inserting the diskette into the C-10 disk drive and typing the command "procall." The distribution disk does not contain a boot track or the file CDOS.COM, however, so if you want the ProCall files on a bootable diskette, you will need to use the C-10 Copyfile utility to copy the files PROCALL.COM and PCMOD.COM. Installing the file PCXFER.COM on a remote CROMIX system can be done easily using the CROMIX Cdoscopy utility, but if the remote CROMIX system has only 8" drives you will need to have the file copied onto an 8" diskette first.

For S-100 systems running the CROMIX operating system, software installation is simplified by the use of the command file INSTALL.CRX included on the ProCall disk. The command file creates a directory called /USR/PKG/PROCALL and copies the software into it. File ownership and access privileges are set properly, and the appropriate links are then made to the /BIN and /USR/HELP directories. As with C-10 ProCall, the file PCXFER.COM should be installed in the /BIN directory of every remote CROMIX system that you intend to call.

Hardware installation is a broad and difficult subject, and the possible configurations are too many to discuss here. The ProCall manual contains all the information necessary to complete any desired hardware setup. The S-100 version of the manual, in particular, gives complete details on all possible hardware and software combinations (e.g., Tu-art vs. Quadart, CDOS vs. CROMIX). Information provided includes switch settings and software configurations for both Tu-art and Quadart I/O boards, wiring information for modem cables and RS-232 cables, and printer setup. I was especially impressed by the section on configuring CROMIX for use with a modem. Sample CROMIX command files are given which allow you to automatically switch a single modem between dial-in and dial-out setups. This information (which is not provided anywhere in Cromemco's CROMIX documentation) is presented in the ProCall manual in complete detail.

Operation

This section will focus on two aspects of ProCall operation: calling the ProCall program, and using the program to perform various tasks. There are two ways to call ProCall. One is to type "procall" in response to the operating system prompt and then answer several questions (about baud rate, number of stop bits, and parity adjustment) that appear on the screen. The second way is to type "procall" followed by one or more command-line options. This second method allows you to bypass the opening questions, thereby letting you have ProCall

called automatically from a command file.

Command-line options are divided into groups: primary options (S to send a file, R to receive a file, T to connect as a terminal to the remote system, etc.) and a secondary option (baud rate). The file-transfer options S (send) and R (receive) can be followed by additional specifiers (T exits to terminal mode after transferring the file, P uses PcXfer to transfer the file, and so on). A third option can be included on the command line: a function key number between 1 and 6. Once in online mode (i.e., connected to the remote system), ProCall will transmit the contents of the specified function key automatically, thereby providing automatic login capability (again, a very useful feature when ProCall is called from a command file). Besides the options listed above, a telephone number can be specified on the command line for automatic dialing (again, further specifiers are possible: *F following the phone number causes ProCall to keep redialing if the remote system is busy or not answering).

Once ProCall has connected your computer to the remote system, the program's full range of commands are available to you. When you type CONTROL \ (i.e., press the \ key while holding down the CONTROL key) ProCall switches to command mode and displays its prompt (Request? =>) to let you know that it's waiting for you to enter a command. Another way to enter command mode is by typing CONTROL-\\. This is the same as typing CONTROL-\, except the full-page ProCall menu is displayed first, followed by the prompt.

The menu breaks the list of available commands into four groups: System commands, ASCII Receive Data commands, ASCII Send Data commands, and Miscellaneous Transfer commands. For example, the following commands are part of the group of ASCII Receive Data commands, used for capturing, viewing, printing, and saving ASCII text coming from the remote system:

(C) Capture ASCII Text Mode ON
(X) Capture ASCII Text Mode OFF
(V) View Text in Capture Buffer
(F) File Captured Text onto Disk
(Z) Zap (Clear) Capture Buffer
(P) Printer Mode (ON/OFF)

The group of ASCII Data Sending commands contains a similar set of functions, useful for transferring ASCII files from your system to the remote system.

To issue a command, you simply type the letter shown next to the command. Another way to issue commands, without having to first enter command mode by typing CONTROL-\ or CONTROL-\\, is to use the function keys on the keyboard (CKBA, CKBC, 3102, and 3101 function keys are all supported). Included as part of the ProCall package is an adhesive strip that labels the function keys with the functions they perform in ProCall.

Operating Features

In addition to the ASCII and binary file transfer capabilities you would expect to find in a communications program, ProCall offers a wealth of additional features. I will point out only a few of the more important ones:

Buffers—ProCall has two separate buffers: one to capture text and one to send text. Both buffers offer "full-feature viewing," which means that you can always tell how much space is left in the buffer, and can display the contents of the buffer on the screen at any time.

Disk Directory Access—Your computer's disk directory can be displayed without leaving ProCall. The program can also display the contents of disk files, and even delete or rename disk files.

User-Defined Function Keys—You can define up to six function keys (using Pcmod.com), assigning to each key any string of up to 40 characters (including control characters). You can mark any point in the string to indicate that ProCall should wait until receiving a specified character from the remote system before continuing to send characters.

The pause indicator \ causes ProCall to wait one second before sending the next character in the string. The \ symbol causes carriage returns to be sent to the remote system at a controlled rate, until a carriage return or linefeed is received from the remote system; at that point ProCall will continue sending the function-key data.

Character-Translation Tables—The Pcmod program lets you specify translations for characters that would adversely affect communications with peripherals or the terminal screen. For example, CONTROL characters that a particular terminal, printer, or operating system would interpret differently than expected can be translated to other characters or ignored completely. There are separate tables for the CRT, keyboard, printer, and RS-232 port.

Printer Flow Control—ProCall automatically checks the printer spooler and acts to prevent the buffer from overflowing.

Data Conversion—Full binary to ASCII and ASCII to binary conversion capabilities are included.

Specifications and Limitations

The C-10 version of ProCall can be run on any C-10 having CROS version 1.05 or higher. There is no boot track on the diskette.

The S-100 version of ProCall runs with CDOS version 2.52 or higher, and with CROMIX version 11.11 or higher. Tu-art, Quadart, and Octart boards are all compatible.

Areas for Improvement

The ProCall program has been on the market now for almost two years. During that period ProtoMatrix has corrected all reported bugs, and has added many enhancements to the program. Frankly, there is very little left that could be done to improve ProCall. Some users may prefer a more "stripped-down" communications program, feeling that they would never use all of the features offered by ProCall. True, ProCall's abundance of powerful features may at first be a little intimidating, especially for a user who is new to computers and data-communication concepts. Over time, though, inexperienced users become experienced users, and there is a correspondingly greater need for the power and flexibility that ProCall offers. The beauty of the ProCall program is that it adapts itself to the needs of the user, rather than making the user adapt to the needs of the program. As your needs grow, ProCall can accommodate those needs, indulging you every step of the way from beginner to advanced user.

Summary Evaluation

Ease of installation	Very Good
Ease of use	Very Good
Documentation	Very Good
Speed	Excellent
Reliability	Excellent
Effectiveness	Excellent

About the Reviewer:

Greg Pepper is a free-lance writer working in San Francisco. He has been using the ProCall program in his work for the past year.

CSTAT—A Statistical Package for CROMIX

by David G. Kissinger, Ph.D.

The CROMIX operating system makes available much of the power inherent in a microcomputer. The problem has been the lack of available software to harness this power for the benefit of the user.

CSTAT is a general purpose statistics package that meets this need. Also, CSTAT is written in C, a language that is inherently faster than interpreted BASIC and provides easier access to CROMIX than compiled BASIC.

CSTAT was developed to provide the statistical power needed to analyze the results from an important research study, the relationship of diet to age of menarche, where databases routinely contained 150-200 variables and 500-1000 cases.

The actual number of cases that can be handled by CSTAT is 65534; the number of variables is limited by available memory, a practical upper limit is around 200 variables, but larger databases can be constructed for archive purposes.

The system requirements are CROMIX version 11.11 or higher, 128K memory, and at least 2 floppy drives.

Originally, CSTAT was written in FORTRAN; it was converted to RATFOR; currently, it is in its third edition in the C language. The upshot of this is that the package is quite mature because the programs were checked out for errors using published data sets, where possible, when transported to a new language or edition. Also, each program was used extensively to analyze real data.

In the current edition of CSTAT, all of the programs are tied together with a series of command files. While this means going back and forth between CROMIX and a program, this procedure is necessary because the CROMIX function TESTINP suggested by Cromemco to prepare interactive command files is slow when it deals with a menu; it takes about 22 seconds to get to the last of 8 items in a menu using a hard disk.

The package occupies about 600 KBytes. The individual programs can be run without using a menu and the supplied system of command files. Information is provided so the user can customize his own set of command files for using the CSTAT package if the package as supplied does not fit on the root device.

CSTAT uses input files with a "standard" format; but knowledge of this format is not needed to run the programs. A program is furnished to convert data from a non-package source into a "standard" file. Details about the standard format are supplied.

Each CSTAT program generates a disk file so that the work of keying in data is not lost and editing of output files is possible. This is important even if one is entering a "short" list of numbers because the 'oops' factor can cause unexpected problems. Hardcopy of any file can be made if desired for checkout purposes and for a permanent record. Statistics produced by the programs are written to a disk file which identifies the date run, the name of the source file, and the operation. All files can be edited according to the user's needs with SCREEN or another edit utility.

Most of the programs can also display I/O and other data on the screen according to the user's desires. If there is a long display that the user does not care to see he can stop the display by depressing any key or start it again by depressing any key.

The package contains five programs to enter, correct and document a dataset, one to convert a "non-standard" set of data into a CSTAT dataset, and four programs to combine or subdivide a dataset or to change a value (recode or transform) in a predetermined way. There are seven programs for univariate and bivariate statistics: STATS, FREQUENCY, TTEST, CORRELATION, BREAKDOWN, GRAPH, and CROSSTAB. And there are two multivariate programs, one for multiple regression, the other for stepwise regression.

Demonstration datasets are provided to exercise the programs and to provide known results. Also included is a manual with instructions, explanations, and demonstration runs.

All in all I have found the package to be useful in analyzing my own data and I am sure that others may find it just as valuable.

A manual explaining the package in greater depth is available from:

David G. Kissinger IACU #41
Box A
Weimar College
Weimar, CA 95376

CSTAT STATISTICS PACKAGE

written in C for CROMIX, uses format-free input and file I/O for easy corrections and editing results. Includes database generation & maintenance; simple statistics; frequency; simple, multiple, and stepwise regression; crosstabulate 2 variables; T test; 2-D plot of 2 variables; breakdown (one-way ANOVA). Customization available. Treats 200+ variables & 65000 cases. Manual $25, applicable to purchase of package; money back 30 day warranty.

For order information contact: D.G. Kissinger, Box A, Weimar College, Weimar, CA 95736.

Current Versions of Cromemco Software

This table lists the current versions of all Cromemco software. It was derived from Cromemco's Software Product Version Report of September, 15 1984. The following notations are used: "NA" implies that the information is not applicable or was not supplied in the product version report. An "*" after the model or release number indicates a preliminary release. Models which have a "-D" indicate 68000 software. Almost all software is supplied on both 8 inch and 5 inch diskettes, so the "L" (for large) and "S" (for small) have been omitted from the model numbers. Also, almost all software is supplied on Double Sided, Double Density diskettes.

MODEL	PACKAGE	RELEASE	VERSION	DATE MASTER CREATED
ANI-D	ANIMATOR (COBOL-D DEBUGGER)	1	NA	10/24/83
AP	ACCOUNTS PAYABLE		02.65	01/11/82
AR	ACCOUNTS RECEIVABLE		02.65	01/11/82
ASM-D	68000 MACRO ASSEMBLER (CROMIX)	2	01.14	02/16/83
BAS-D	68000 BASIC	1	02.10	11/07/83
C10CPM	C-10 CP/M OPERATING SYSTEM	1	02.00	01/17/84
CAMR	CALCMASTER	4	NA	02/29/84
CCC	CROMEMCO 'C' COMPILER	2	05.10	01/04/83
CCC-D	68000 'C' COMPILER	3	02.15	05/17/84
CDS	CROMEMCO DIAGNOSTIC SOFTWARE	4	NA	07/15/83
CISAM-D*	C-ISAM	1*	1.02	06/13/84
COB-D	68000 COBOL COMPILER	2	NA	11/04/83
COLL	CROMEMCO OVERLAY LINKER	3	02.04	03/25/83
CRO-D	68000 CROMIX OPERATING SYSTEM	7	20.63	05/16/84
CROMIX	Z-80 CROMIX OPERATING SYSTEM	11	11.27	07/03/84
CSPD	C-10 SUPER PACK	6	NA	07/25/84
CXDR	CROMIX DRIVER PACKAGE	1	NA	05/18/83
DAZZLER	DAZZLER GRAPHICS SOFTWARE	NA	NA	07/08/80
DBM	DATABASE MANAGER/REPORTER	NA	03.05	01/08/81
DGR	DAZZLER GRAPHICS PACKAGE	NA	NA	07/07/80
DIMR	DISKMASTER	1	01.05	12/28/83
DIMR*	DISKMASTER	2*	01.11	09/08/84
DOS	CDOS OPERATING SYSTEM	12	02.58	11/07/83
FDA	Z-80 MACRO RELOCATING ASSEMBLER	12	03.10	07/18/83
FDB	Z-80 BASIC	11	05.70	03/29/83
FDC	Z-80 COBOL COMPILER	6	04.64	03/29/83
FDF	Z-80 FORTRAN COMPILER	11	03.42	03/30/83
FDG	GAME PROGRAMS	NA	NA	09/04/80
FDR	Z-80 FORTRAN WITH RATFOR	4	01.05	03/29/83
FM2-D	FORMS-2 (COBOL-D FORM GENERATOR)	1	NA	10/24/83
FOMR	FONTMASTER	5	01.16	08/19/83
FOR-D	68000 FORTRAN COMPILER	6	02.15	05/17/83
FSTBAS-D	68000 FAST BASIC	1	02.10	03/23/84
FSTCCC-D	68000 FAST 'C' COMPILER	2	02.15	07/05/83
FSTFOR-D	68000 FAST FORTRAN COMPILER	2	02.15	07/05/83
FSTPAS-D	68000 FAST PASCAL COMPILER	2	02.15	07/05/83
GL	GENERAL LEDGER PACKAGE	NA	02.61	01/11/82
IDS	IOP DEVELOPMENT SOFTWARE	6	03.00	07/25/83
IN	INVENTORY PACKAGE	NA	02.65	01/11/82
INFX-D	INFORMIX (68000 RELATIONAL DBMS)	1	03.11	04/24/84
KSAM	KSAM FILE ACCESS SYSTEM (CROMIX)	3	01.04	03/01/83
LSP	LISP	5	01.08	03/31/83
NET	C-NET NETWORK SOFTWARE	2	NA	03/20/84
PAS-D	68000 PASCAL COMPILER	5	02.15	05/17/84
RBTE	REMOTE BATCH TERMINAL EMULATOR	5	01.08	11/17/83
RPG	Z-80 RPG II COMPILER	4	03.02	03/31/83
SDDDEMO	SDD DEMONSTRATION SOFTWARE	1	NA	01/26/84
SDIDEMO	SDI DEMONSTRATION SOFTWARE	5	NA	04/04/83
SGS	SDI GRAPHICS SOFTWARE	6	02.00	09/06/83
SLMR	SLIDEMASTER GRAPHICS EDITOR	4	02.03	04/26/83
SMDS	SMD DRIVE CONTROLLER SOFTWARE	2	NA	07/06/84
SPICE-D	SPICE CIRCUIT DESIGN SOFTWARE	1	11.02	06/21/84
SPMR	SPELLMASTER SPELL PROOFING PROGRAM	5	01.20	06/27/83
STB	32K STRUCTURED BASIC	11	03.65	03/31/83
STB-D*	68000 STRUCTURED BASIC	1*	3.65.04D	04/13/84
STMR	STATMASTER STATISTICAL PROGRAMS	2	01.04	07/21/83
TDS	TAPE DRIVE SOFTWARE	4	11.11	04/01/83
TEMR	TELEMASTER COMMUNICATIONS SOFTWARE	2	02.06	04/24/84
TSDI	TRI-SDI GRAPHICS SOFTWARE	3	NA	04/01/83
TSS	TRACE SIMULATOR	NA	02.06	03/06/80
WPS	WORD PROCESSING SYSTEM	11	06.00	04/01/83
WRMR	WRITEMASTER WORD PROCESSING SYSTEM	9	00.67	01/09/84

Communications Controller

Continued from front cover

interrupt service, and general supervision of the desired protocol. The Z-80B CPU, which runs at 5.5 MHz, can execute a program stored in the 16K byte ROM or accept a program "downloaded" from the host. A 64K byte array of RAM is supplied for data buffer and program storage needs. This local processing power allows demanding communications applications to be run without burdening the host system.

Many asynchronous communications features are included: selectable data length from five to eight bits; optional parity modes; one, one and one-half, or two stop bits; baud rates from zero to 19200 baud; and error detection for overrun, frame and parity errors.

Both bit- and byte-oriented protocols are supported in synchronous communications.

Byte-synchronous protocol features include internal or external character sync on one or two sync characters, CRC generation and check with CRC-16 or CCITT polynomials, and selectable CRC initialization state.

The BIART supports bit-synchronous protocols, such as SDLC and HDLC, with a variety of features: flag generation and detection; automatic zero insertion and deletion; I-field residue handling; CRC generation and checking; and programmable user address.

Synchronous communications can be run at speeds up to one million bits per second and are programmable for NRZ, NRZI, or FM data encoding and decoding. A programmable digital phase-locked loop is included for clock recovery.

The BIART carries a U.S. suggested retail price of $795, with shipments beginning in October, 1984.

Biart Technical Specifications

Processor: Z-80B
Clock Rate: 5.5 megaHertz
Memory: 16KB EPROM/ROM, may be bank selected in or out under program control
64KB RAM, upper and lower 16KB sections alternate with ROM memory through program controlled bank select
Serial Channels: Two independent full duplex serial channels implemented with a Z-SCC chip
Serial Protocols: Asynchronous, bisync, HDLC, SDLC, and SDLC loop mode
Serial Rates: Up to 19,200 baud asynchronous, 1 megabits per second synchronous
Modem Support: RTS, CTS, DCD, DTR, TXC, and RXC
Parallel Port: Eight bits
Interface Standards:
RS-232
RS-422
RS-423

Conversion of the C-10

Continued from front cover

in such a way that they interface with the user in Hebrew. Further, this feature was desired to be available at the flick of a finger.

It is easy to see that significant losses in productivity can result if programmers have to make a host of mental adjustments from their cultural ways of reading and writing each time they approach a programming task.

In order to overcome the inherent difficulties, we were asked to make changes to the C-10 terminal functions. The changes were to solve four areas of concern, and were to allow:

1) display of full, Hebrew character sets including boldfaced characters;
2) displacing the keyboard's key output by software control, so that it will appear the same as a Hebrew typewriter keyboard;
3) enabling CRT cursor movement from right to left, while displaying characters including all screen functions and attributes (mirrored functioning); and
4) the choice of working from left to right, or right to left, changing directions by software control.

To accommodate these features, it was determined that a revised CROS (Cromemco Resident Operating System) would be desirable. A ROM simulator consisting of 16K of CMOS RAM was developed. The ROM simulator appears to the C-10 as if it were ROM when inserted into the CROS socket, using standard flat cable and DIP header. Communications with the S-100 bus are established by using some data and address switches that connect the RAM (ROM simulator) to three parallel ports on the S-100 interface board.

With the aid of the CROS source code, all of the goals set out above have been reached. The CRT deflection fields are manipulated by software control, as is the character generator. We now use eight character sets; four for the Hebrew version, as well as the four originals.

Keyboard conversion is accomplished by filtering all the ASCII lower-case characters through a conversion table on a flag in an unused area of C-10 RAM. Of course this also required some of the ROM area, so CROS was reduced to far below its normal message load—so far that most of its diagnostics messages are now laconic.

To finish off the project, we sent the keytops out for pantograph conversion from the supplied English letters to Hebrew characters.

There are now many converted C-10s working in Israel using such programs as WriteMaster, WordStar, accounting packages, and even a Hebrew version of SCREEN. They have been in use long enough to know that the converted systems do, in fact, tend to increase productivity.

About the Author

Uri Chamish is a systems and hardware support engineer for Microcad, Ltd., 5 Ausishkin Street, Ramat-Hasharon 47210 israel. Mr. Chamish attributes full credit for the C-10 software modifications to Mr. Yair Ben-Nissam, a freelance specialist in system alterations and realtime controls in Israel.

UNIX System V Q&A

Continued from front cover

many of them and many users rarely or never refer to them. The complete set of manuals is nearly a foot thick when stacked. The on-line manuals contain the same information at lower cost for the user. For prior similar products, some customers have requested to return unused manuals for credit. This is representative of Cromemco's response to frequent customer feedback, and an effort to keep the cost to the customer down.

19. Do Cromemco X-series computers have demand paging?

Yes. The XMM allocates memory in 4096 pages of 4096 bytes. These pages are allocated on operating system demand.

20. Why is the STDC so important for UNIX?

The STDC represents a new performance level in the state-of-the-art in five inch

Winchester disk speeds. Its four track cache memory architecture invites performance comparison with other five-inch Winchester hard disk drive systems. It is very fast.

UNIX uses the disk for many more functions than other operating systems such as CROMIX. While CROMIX can be run with floppy disks alone, with UNIX this is simply not practical because of the incredibly slow execution speeds that would result. Even the WDI-interfaced drives cannot be practically used because of the great performance demands put on the disk by UNIX.

21. So what is required to upgrade an older system to UNIX?

A minimum UNIX system has an XPU (replaces DPU), an XMM (new), and STDC (replaces WDI), MCU rev. K (older revs. do not work and it is not possible to modify older revs. to make rev. K), 64FDC (4FDC and 16FDC do not work) and 512 MSU (may require simple jumper wire modification to work with Rev. K). Multiple user terminals are supported only with OCTARTS; no drivers for IOP/QUADART or TUART are provided. Serial printers and modems may be connected to the OCTARTS. 256KZ memory can be used in place of the 512 MSU. Of course the new 2048 MSU can also be used.

Upgrades preserve primarily the 64FDC, 256KZ, 512MSU, and OCTART boards in the computer. The other interface boards such as the TUART, IOP/QUADART, GPIB, analog interfaces, and parallel ports, will work but no Cromemco supplied driver software is available. The major cost item in the upgrade is likely the cost of an STDC-based hard disk, but even with this, systems purchased a few years ago for $25,000 with terminals and peripherals can be upgraded for typically less than $10,000.

Cromemco plans to support the SMDI interface, and the 9-track tape interface with driver software in the near future. For users with SMD hard disks the upgrade cost is even less and the benefit greater than users with smaller hard disks.

22. What are standards associated with the ETHERNET?

Cromemco supports the ETHERNET local area networking technique developed by XEROX with UNIX V. The ETHERNET standard is only a hardware standard pertaining to the cable and interfacing electronics to that cable. Cromemco has made available the ENET board pair. This board pair inserts into the Cromemco CS-100 or CS-300 bus.

A cable from the pair may be connected to another device called an ETHERNET transceiver which is typically physically attached to the ETHERNET CABLE. The transceivers are available on the open market from companies like 3COM in Mountain View, CA for $450. The transceiver clamps onto the cable automatically, or by drilling holes in the cable. Since the cost of the cable may be $3 per foot, once the transceiver is attached, users prefer not to remove them. Most transceivers provide DB-9 connectors for attaching the computer. This is an ETHERNET standard and this DB-9 is what Cromemco supports.

In addition to the hardware, ETHERNET requires B-NET software to run under UNIX V. B-NET is a University of California at Berkeley enhancement to UNIX that Cromemco has ported to UNIX V. Since it is only a special purpose software dirver, it does not lead to any UNIX V standards conflicts or incompatibility. Cromemco is being very careful to preserve UNIX System V software standards.

The B-NET software is quite sophisticated and allows users to log in to other computers on the ETHERNET as well as to move jobs on to those computers and execute them. Thus, a user may offload a job to another unused computer. For example, a VAX 11/780 running Berkeley 4.2 UNIX with B-NET (not uncommon) could be sent jobs to execute via this ETHERNET link (this is common in CAD applications). The B-NET software with other applications software allows the user to consider all the files of all the computers on the network as if they were in his local computer.

The software communications protocol that makes this all work is called TCP/IP. This is a well-known standard protocol because it is what is used in the ARPANET and DEFENSE DATA NETWORK (DDN) which are 56K baud telephone leased-line based networks.

The other ETHERNET protocols are XNS (Xerox) and 3BNET (AT&T proprietary). The TCP/IP protocol is almost a universal standard in microcomputer applications at this time.

23. Can I use other terminals on Cromemco UNIX?

Yes. In fact Cromemco has ported the University of California program TERMCAP to the Cromemco UNIX system. This program is a general purpose terminal interface program which facilitates the conversion of the "escape sequences" required for the user's terminal to that which UNIX expects. This TERMCAP interface program makes it possible to interface the same program to many different terminals. This program reduces asynchronous terminal interfacing difficulties, particularly when different terminal types are used on the computer. It offers no solution for synchronous terminal communications, however, which is a much more difficult problem.

24. Can I communicate with other UNIX computers using standard 300 baud or 1200 baud modems?

The Cromemco port includes UUCP which is a standard UNIX-to-UNIX telephone networking package similar to CCALL in CROMIX. Error correction is provided for UNIX-to-UNIX file transfer. This UUCP transfer protocol is similar to the file transfer protocol known as the Ward Christiansen X-MODEM protocol in the CP/M world. Both provide error correcting file transmissions between similar operating systems on differing hardware.

25. Can I use modems with the OCTART? Does it have enough handshake lines for good modem interfacing?

Yes, you can use the OCTART with modems. However, some users wish to utilize the carrier detect output from a modem to automatically log the users off and hang up the computer end of the phone line when a remote user hangs up the phone on the terminal end without logging off. The current software does not support this feature, but is planned for future versions.

The automatic logoff feature requires hardware and software support in the OCTART for the Carrier Detect handshak-

ing line which most RS-232 modems support.

This automatic logoff feature requires software in the OCTART to log off the user when the handshake receiver senses a negative input signal indicating the carrier detect signal is absent. The current software in the OCTART does not support this feature but a new version available in early 1985 is expected to. To use this upcoming software the hardware needs to be connected to the proper handshaking lines.

The OCTART board was designed from the start with the three basic (send, receive, gnd) lines and two handshaking lines (one receiver, and one transmitter). For use with standard modems, it desired that the carrier detect line interface to the OCTART handshake receiver line. This can be done by simply wiring to the appropriate receiver on the rear panel DB-25 connector for the OCTART.

The OCTART cluster cable is model OCT-CBL. This cable provides a separate DB-25 female connector for each serial port. Five lines are supported by each of the four DB-25 female connectors provided by the cable.

The OCT-CBL cables support: (send:pin 2, receive: pin 3, gnd: pin 7, RTS: pin 4 and CTS: pin 5). To provide automatic logoff obtain a cable with wiring of the modem pins 2, 3, 7, 8 to the OCT-CBL pins 3, 2, 7, (4&5) respectively.

26. How much RAM memory can I put into a Cromemco CS-300 computer?

The answer is 16 megabytes using 8 of the 2048 MSU memory boards. Since the MCU rev. K is certified for only 6 of the MSU memory boards, two MCU boards must be used to achieve this memory size. In this configuration, four memory boards would be driven from each of the MCU boards.

It is interesting to note that since the CS-300 supports 20 board slots, a standard 16-megabyte computer only requires 15 boards including an Octart for serial I/O (XPU, XMM, 2-MCU, 8-2048MSU, 64FDC, STDC, OCTART). This leave five slots for other interfaces.

It is also interesting to note the 16 megabyte configuration contains approximately 200 million transistors. Yet even with this included complexity, we have 5 spare slots.

27. What does the memory map look like for programs running under UNIX?

UNIX assumes all programs run from logical address zero, including the operating system kernel. Thus, when running a program, the XMM memory mapper translates the addresses of currently available physical memory into contiguous logical addresses beginning at zero and continuing to the extent required by the program.

Fortunately, the demand paging scheme supported by the XMM allows very efficient re-mapping of memory. Thus, little execution time is wasted in doing system overhead.

28. What does the XMM do in the Cromemco UNIX systems?

The XMM board is required to run all UNIX software on Cromemco computers. This board makes all the UNIX software run faster than if the functions it performed were done in software. The competitive systems to the Cromemco system vary in how much of the memory management function is performed in software and how much is performed in hardware, but very few offer the hardware sophistication of the XMM. This means a Cromemco XMM-based UNIX computer will be very fast in memory management benchmarks, such as process switching benchmarks.

The XMM board permits each program which runs under UNIX to have the use of all installed user memory at whatever memory addresses the program requires (memory address translation). The XMM board also prevents each program from altering other programs or the operating system or performing I/O operations without permission (memory protection).

The XMM board is without performance rival in the microcomputer marketplace. It offers a new state-of-the-art for memory mapping speed, just like the STDC establishes a new level of performance for 5-inch Winchester drives.

Technically, the functions facilitated in hardware are: 1) memory address translation, 2) task isolation (memory protection), 3) sharing of RAM, 4) elimination of external fragmentation in memory allocation. Thus, the XMM memory management hardware allows you to "do for RAM what you do for disk." That is, provide an efficient, easy-to-use way for many independent processes to co-exist peacefully in memory, to allocate memory without wasting space, and to maximize system throughput by providing these functions in hardware to the extent practical.

In operation the XMM divides each process's 16-Megabyte address space into 4096 equal pages. Each piece is 4096 bytes in size and is called a page. There are 16 bits of information associated with each page used by a process. 12 bits contain the address of the page in physical memory and 4 bits contain the attributes of the page. A "page table" containing the information associated with all 16 Megabytes of a process's address space would require 8 Kbytes of RAM per process. Since most processes use much less than 16 Megabytes of memory the XMM permits individual page tables for each 512K of memory used by a process. Consequently, most processes require only 768 bytes of main memory for their page tables.

Many competitive memory management systems require that each page table entry for each process be loaded into the memory management hardware by software in the operating system. The XMM automatically DMA transfers the page table entries into its 55 nanosecond translation buffer as they are needed by a process. Only the 32 entries for the process's 32 segments need be loaded into the XMM by the operating system. There are 15 sets of segment registers on the XMM so that the registers need not be reloaded when switching among processes. Selecting another process's memory map during context switching is as fast and simple as changing the byte that contains the number of the currently active set of segment registers. This hardware-intensive approach results in significantly faster context switching with the XMM than the competitive products using software-intensive approaches.

One of the new features of using the XMM under UNIX V, besides the competitive speed advantages, is protection against destructive user programs, because user instructions cannot access

Dr. Roger Melen, Vice President and co-founder of Cromemco, Inc.

memory allocated to another user. If this accessing is attempted, control reverts to the operating system, and the user with the violating program is issued an error message.

For more detailed information on the XMM, one might look into the Wescon/MiniMicro Conference paper of S. Gross (of Cromemco) entitled "An IEEE-696 Bus, Virtual Memory, Desktop Computer Architecture." This paper discusses how the hardware is designed to use the anticipated future release of virtual memory versions of UNIX V.

29. My XPU includes a 68000R10 microprocessor chip. Can I use the 68010R10 microprocessor in its place?

The XPU was designed to accommodate both the 68000R10 and 68010R10 microprocessor chips. The chip included on your board is in a socket and can be replaced with either part. During the first production runs of the XPU, the 68000R10 is the only part available in production quantities for Cromemco to use. There are no limitations to its use for presently supplied software. The 68010R10 will be required to run in virtual memory mode in the future. It is not a major job to insert the new chip into its socket when it is available, thus making the upgrade of 68000R10-based systems straightforward.

30. Do you have the "fast file" feature of Berkeley UNIX 4.2?

Cromemco has implemented much of the disk sectoring job in a hardware disk accelerator in the Cromemco computers called the STDC interface board. Berkeley UNIX was optimized for a VAX which benefited greatly from 4096 byte buffers and sectors in place of the 512 byte sectors found in standard UNIX System V and other versions of UNIX. This larger 4096 byte buffer/sector provided higher system speed on the VAX in disk file operations. The Cromemco STDC uses cache memory techniques to buffer four tracks totalling 40,960 bytes. This approach is widely used in mainframes and high performance computers to attain high disk throughput and yet maintain the standard sector size of UNIX System V. The results of benchmark comparisons of the STDC are truly impressive.

31. Is it required that I use both a MCU and XMM in my system, or does the XMM replace the MCU?

Systems do require both the XMM to do memory mapping and the MCU if error correcting memory (512MSU or 2048MSU) is desired. If 256KZ memory boards are used no MCU is required, but an XMM is still needed.

32. Can I use my WDI or WDI-II with UNIX V systems?

No. UNIX V requires an interrupt-driven interface to achieve a minimum level of performance. The STDC more than qualifies since it is interrupt-driven, intelligent and has cache memory.

33. What printers do you support with UNIX?

Printer support is provided for standard serial RS-232 interface printers supporting XON/XOFF protocol. This support is for draft mode printing. For daisy wheel printers doing wordprocessing applications, the printer support depends upon the word processing package.

34. What are these new little cables I have running between my boards?

The OCTART, the 64FDC, and the STDC are interconnected by an interrupt priority cable. The STDC is given highest priority. If additional interrupt driven devices are attached it is necessary to use an extended cable to connect to those devices.

A new cable, the DMA priority cable, is required in systems with multiple asynchronous DMA devices, such as a machine with both an STDC and a Maximizer. Consult the supplied documentation when adding new boards to a system about the specific cabling requirements for those boards.

35. How do I find out more about how your memory management hardware works?

The Cromemco XMM is one of the fastest and most advanced memory managers in the microcomputer industry. The DMA-assisted translation memory map loading and the large size of this mapping memory are unique for this size of computer. These features when combined with the large number of attribute options per mapped page provide a new performance level for microcomputing.

There are two excellent references for further study. One is the 1983 Wescon/MiniMicro Conference paper by S. Gross entitled "An IEEE-696 Bus, Virtual Memory, Desktop Computer Architecture." The other is a Cromemco manual entitled "XMM Technical Reference Manual."

36. How are the CS-100 chassis and CS-300 chassis different from the CS-1H chassis and CS-3H chassis respectively.

The chassis of the CS-100 is nearly identical to the CS-1H chassis with four exceptions:

a. The front panel is comprised of a single piece casting that can accommodate only one floppy disk.

b. The hard disk subchassis has been modified to permit removal of the hard disk without removal of the front panel casting.

c. A new rear I/O subpanel that provides for mounting a champ-type connector to support the new cartridge tape drive. The number of DB-25 cutouts is reduced from eight to six on this I/O panel.

d. The color is changed to single color beige from two color brown and beige.

The chassis of the CS-300 is nearly identical to the CS-3A except:

a. The front panel is now comprised of two castings enabling the card cage to be opened in smaller spaces.

b. A new key switch is introduced with a smoother mechanism.

c. The rear I/O subpanel has been modified with the champ-type connector cutout to support the new cartridge tape drive. The number of DB-25 connectors supported is 16 for this new chassis.

d. The color of the main chassis has been changed from brown and beige two tone to a single color beige.

e. There is a new card cage retaining mechanism consistent with the front door changes.

f. The number of card slot positions is reduced by one to 20 slots. The front slot of the CS-3H was removed to accommodate the new key switch.

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32K Classroom

32K Classroom is a regular column aimed at explaining various programming techniques using 32K Structured BASIC. Users are encouraged to submit examples of their own which may help others in understanding and using this powerful language. Call or write I/O News, c/o 32K Classroom, for details on submitting editorial material.

A Program to Print Text Files Created by SCREEN

by Bernie Thomas

As I started to use SCREEN to write letters, articles, etc., I became aware of a need to format the text to suit my needs. Using the PRINT feature of SCREEN left a lot to be desired. If my text was more than one page, for example, I couldn't find an easy way to number and print uniform pages.

The following BASIC program solved the problem. ⟶

```
100   Rem PROGRAM TO PRINT TEXT WRITTEN BY SCREEN
110   On Esc Goto Finish
120   Dim File$(13),Default$(13),String$(119)
130   Input"ENTER the file name )",File$
140   If File$="End" Or File$="END" Then Close : Stop
150   If File$="" Then File$=Default$
160   Open\6\"$LP"
170   @\6\Chr$(12) :   For X=1 To 5 : @\6\ : Next X : Line=6
180   On Error Goto 130 : Open\1\File$
190   Input\1\String$
200   If Line=57 Then  Do : Page=Page+1
210     @\6\ : @\6\ : @\6\ : @\6\Tab(70);"Page ";Page
220     @\6\Chr$(12) :   For X=1 To 5 : @\6\Chr$ : Next X : Line=6
230     Enddo
240   @\6\String$ : Line=Line+1
250   Goto 190
1000 *Finish : Default$=File$
1010   Page=Page+1
1020     For Times=1 To 60-Line : @\6\ : Next Times
1030   @\6\Tab(70);"Page ";Page
1040   Page=0 : Line=0 : Close : Goto 130
5000 *Sav : Save"g:Printtxt.utl"
```

Since SCREEN creates an ASCII file, and all ASCII files are terminated by an ESC, LINE 110 is necessary to finish the program.

LINE 130 asks for the name of the file you wish to print.

LINE 150 allows you to print the file again by merely pressing RETURN when asked the second time. Note that LINE 1000 sets Default$=File$.

LINE 190 is the key to the whole program. When writing in SCREEN, it is important that every line be terminated with a CARRIAGE RETURN as is explained in the SCREEN Manual. Because of this, LINE 190 will fill the variable String$ with the next line of the file each time it is encountered. The last input will be the ESC and the program will go to Finish, and print the last page number in the proper place.

Have you ever received a letter that was obviously computer generated, but contained your name and address and your name was repeated several times as though it were personally written to you? You can do this by composing your letter using SCREEN and substituting some code such as an asterisk every time you wish to use a name.

Now rewrite the above program deleting LINES 130 to 150 and add the necessary code to sequentially read a file of names and addresses. Change LINE 170 to print the name and address in the desired format.

Then include a line of code such as P=Pos (String$, "*",0), and if P is greater than −1 then substitute the name for the asterisk.

I have also written programs to print company letters, quotes, etc. which standardize the format so that the writer need only type the body of the document, and it is always printed to a uniform standard.

If you desire more information, please write and I will be happy to expand or explain.

LINE 5000 is a technique I started using early on in my programming career to avoid a disastrous problem I was having. Several times I saved a program on which I was working using the name of the previous program on which I had been working. The result was, of course, I lost the previous program unless I had happened to have backed up in the meanwhile. Now the very first thing I do is write line 5000. When I wish to save it to the disk, I merely type Goto Sav.

Bernie M. Thomas
6504 Jocelyn Hollow Road
Nashville, TN 37205

We're Interested!

We're Really Interested...in what you have to say. Especially about how you use your system...the problems encountered and the solutions effected...unusual uses or environments...and any practical applications you would be willing to share with fellow members. These can be short notes for departments like 'bits & bytes...' and 'Tec Tips,' or full feature articles.

Contact Richard Kaye or Lynn Platzek at I/O News for editorial guidelines or assistance. We're interested in unleashing your literary talents.

Close Encounters of the C-10 Kind

Close Encounters of the C-10 Kind is a regular column directed to users of Cromemco's personal computer, the C-10. It is edited by Dr. Tom Beer, of Applied Environmetrics, located at 118 Gordon St., Balwyn, Victoria 3103, Australia. Dr. Beer can be reached by phone during business hours at 8180264, and at home at 802571.

If anyone has tried to contact me at the home phone number given in the header to the C-10 column then they will have been disappointed for my home number only contains six digits, and is 802571. The exchange will be changing to seven digits at some stage in the future (it is planned for May next year) but until then the above number holds —and not the incorrect one printed in past editions of I/O News.

This month I want to mention aspects of the C-10 related to brightness and to direct console input. Both of these topics are related by the fact that they require usage of the input or output ports. This may sound confusing to many C-10 owners and indeed it is. The explanations given below will, I hope, remove some of the mystery.

Why bother? Well, in addition to the intellectual satisfaction of knowing more about the workings of the C-10 the use of input and output ports can speed things up tremendously. There is however a price to pay, which is why the computer books recommend that you do not access input or output ports directly. Any program that accesses ports directly is machine dependent and cannot be transferred to another computer. Keep it in mind.

Brightness

I find that the terminal is not at all kind to my eyes. Other friends rather like it. The brightness can only be changed via software—there is no little brightness or contrast knob on the front panel of the C-10 terminal—and the brightness returns to the default brightness of "too bright" at each and every boot. Because I find the terminal disconcerting I normally place it as far away from my eyes as I can get the keyboard cable to stretch. This "solution" seems to have raised its own problems. There now seems to be a certain amount of play at the keyboard-cable connection point and occasionally I lose power. If I try to power up with the cable fully extended then there are times when nothing happens until I push the keyboard closer to the terminal and take the tension off the cable. Though one solution might be to consult an opthalmologist, I felt sure that there should also be a software solution quicker than running the program BRIGHT every single time that I boot.

Whilst perusing the technical reference manual, I noticed in Appendix K that Output ports 60H to 63H are used for video intensity control. (The H means that 60 and 63 refer to hexadecimal numbers. In BASIC hexadecimal numbers have percentage signs around them so that %60% is the BASIC way of writing 60H) I tried them out in BASIC, and sure enough, **Out %60%,12** will change the background level whereas **Out %61%,3** changes the foreground level. The second number determines the level setting and ranges from 0 to 15. This means that one can use the following procedure to set the terminal to a pre-determined brightness on booting up: Experiment with **Out %60%,x** and **Out %61%,y** in SBASIC to find the values of x and y that are personally most pleasing. Once you know these values, write a two line BASIC program that defines them; for example:

```
10 Out %60%,0
20 Out %61%,10
and then issue the command:
Save "brt.sav
```

Use SCREEN to create a file called Startup.cmd whose sole contents will be a single line: Sbasic brt.sav

You will find that Release 3 and subsequent CDOS will call up Startup.cmd and execute the instructions within it. The only instruction in it is to enter Structured BASIC and execute the program brt.sav which changes the video screen attributes. This is done and the menu is then called.

Those of you with access to the assembler and linker may find this assembly language program to be quicker:

```
BRIGHT: EQU  0AH
PORT:   EQU  61H
ABORT:  EQU  0
START:  LD   A,BRIGHT
        OUT  PORT,A
        JP   ABORT
        END  START
```

This corresponds to the brightness settings that I prefer. The default for port 60H and 10 (hexadecimal 0A) for port 61H.

This all sounds well and good. The only fly in the ointment (or unwanted brightness in my otherwise dark life) is that the menu program itself adjusts the brightness. This can be quite dramatically seen by exiting from the menu and calling up the program BRIGHT and using it to adjust the screen to an almost invisible brightness. Then run the program given above. The screen will leap back to visibility. Type: menu. The screen will return to near invisibility. I also notice that BRIGHT offers the option of a return to the default values. This implies that the default values must be put into some memory location by CDOS.

Obviously information on the brightness values is being stored in memory and a careful reading of the Technical manual's Appendix J landed this fruitful fish:

```
.intensp equ 18 ;Pointer to C-10 intensity byte.
```

Getting any sense out of this typical piece of computerese requires a bit of machine language programming, using CDOS system call 81. The end result of this magic wand waving is that memory location E9D6 and E9D7 contain the address of the byte that holds the brightness information. If you **PEEK** at these two memory locations you will find F4 in the first one and FF in the second.

One of the peculiarities of the Z80 processor is that addresses are held in memory with the low byte first and the high byte last. So the magic memory address is FFF4. What I did next was to run BRIGHT and then have a look at how the contents of FFF4 and the memory locations on either side of it changed. It looks as if FFF4 controls the background level and FFF5 controls foreground level. Thus it is probably a good idea to add two lines to the BASIC program given above

```
30 Poke %FFF4%,0
40 Poke %FFF5%,10
```

Of course it would be even more efficient to change CDOS.COM so that the preferred defaults are automatically loaded into FFF4 and FFF5. However I do not know where in CDOS this is done and anyway, when the long awaited Release 5 ROM chip arrives with CDOS burnt into it then one is back to the old position of having the defaults automatically loaded during the system boot.

The Great Poll Competition

The SBASIC manual supplied with the C-10 has an example in it that drives me mad. Turn to the page in section 18 that

deals with the INP(m) command. There is an example given there of how to use the command. The example relates to polling the console input port. If you try the example, as given in the manual then you will hang your C-10. The reason for this is that the example treats port 0 as the status port—which is supposed to tell the computer when a signal is ready—and port 1 as the port on which the data comes in. Neither of these two numbers is correct in the case of the C-10, and Appendix K of the technical manual indicates port 31H is that for status and port 30H is that for data. The example given must have been written for another computer.

I then thought that the example in the SBASIC manual could be made to work by substituting **%31% for 0** and **%30% for 1** in the port numbers. Not so. The example still does not work. I then tried a number of other weird and wonderful possibilities without any success. I have written to a few people about this problem and have found it to be one of the quickest possible ways of getting rid of potential pen-friends. As I would really like to know the answer I have decided to have a competition. Hence the following competition (the very first I/O News competition, I believe.)

The contest:

Rewrite the INP(m) example in the SBASIC manual so that it works.

The Prize:

A copy of the C-10 Fun Disk to the winning entry.

The Rules:

1. You must use the INP(m) command to accomplish the console polling and input.

2. Entries accepted until the I/O News following this one reaches Australia. This should give everybody world-wide a chance. If more than one correct entry is received then the correct entries (and the definition of correctness is whether or not it works on my C-10) will be put in a hat and one drawn out.

The reason for Rule 1 is that there are lots of other ways that one can get a character from the console and display it on the screen. Leigh Thomas, who wrote an excellent article on using the C-10 external ports (I/O News Volume 3 number 5), points out that if you are using SBASIC then just use GET\0\. The zeroth channel is perpetually open to/from the console and has precisely the same result as the INP(m) example which does not work. Now GET\0\ does indeed work perfectly well, but it can be painfully slow. A slightly better solution—in terms of speed—is to use CDOS system calls, and in this regard the SBASIC manual is very helpful because the example on the USR command shows how to make CDOS system calls from SBASIC. Unfortunately you require a bit of knowledge of assembler and the Z80 op-codes to use them.

Good luck.

Further Reading

Leigh Thomas, Using the C-10 "Computer" port for interface to external equipment, I/O News, Vol 3 #5, page 10.

C-10 Technical Manual.

NEED

Used boards/peripherals to expand my Z2D; or offers to buy it (with VK404 "Wordstar" terminal, dazzler graphics, and 3355A printer).
Ian Morrison, 729 Hazelwood Ave., Pittsburgh PA 15217.

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Inside CROMIX

Inside CROMIX is an open forum on both eight-bit and 16-bit versions of CROMIX. The subject matter is limited to experiences which will help CROMIX users derive more from their systems. Members' contributions are invited. Inside CROMIX is edited by William E. Jaenicke, Technical Editor of I/O News. Jaenicke has been working with Cromemco systems and CROMIX for more than four years as an independent software consultant. He is available for consultation on CROMIX and can be reached by phone at (714) 955-0432.

EDITOR'S NOTE:
The following is reprinted from the Cromemco User's Group (CUG) Newsletter, No. 8. It was originally submitted by Adrian Pickering of Dundee University Microcomputer Center.

Mounting And Unmounting Disks By Non-Privileged Users

The system utilities MOUNT and UNMOUNT are only available to the system's superuser. Security in CROMIX is maintained through file ownership and access rights. The creator of a system utility must be able to grant restricted access to an ordinary user during the run of the utility. This is done by changing the effective user identity to that of the owner of the program, just while the program is running. To accomplish this, the **.setuser** system call is used, with arguments requesting that **id.effective** is changed to **id.program.** Because the effective id must be that of a privileged user, and the id is to be set to that of the owner of the utility, it is essential that the utility be owned by SYSTEM. Other users need then be granted "execute" access only in order to use the utility. The superuser can so specify these attributes using the **chowner** and **access** utilities of CROMIX. Security is maintained by relying on the inability of users to change file ownerships or tamper with system programs.

The Z80 code below allows ordinary users to mount and unmount their own discs. The utilities do **not,** however, alter the mount table. To avoid scrambling the table, MOUNTA and UNMOUNTA must not be mixed with the normal system utilities MOUNT and UNMOUNT. Since ordinary users are not able to use MOUNT and UNMOUNT, the problem will not affect them. However, 'SYSTEM' must remember the rule.

To create the utilities, set up a file, e.g. MOUNTA.Z80, and edit in the code. Make sure the file JSYSEQU.Z80 is available in the current directory (normally located in directory /EQU) and run the assembler ASMB (version 3.0 or higher), e.g., ASMB MOUNTA. Link the program with BLINK -NQR, e.g. BLINK -NQR MOUNTA and then move the resulting .BIN file to /BIN. There are no arguments required in the call. As written, the disc will be mounted on /A on device FDA. The device and mount directory can be changed by suitably altering the 'devpath' and 'nodepath' lines.

MOUNTA

```
;
*INCLUDE JSYSEQU.Z80
;
DEVPATH DB      '/DEV/FDA',0        ; device is large floppy drive A
NODEPATH DB     '/A',0              ; 'dummy file a' entry off the root
;
START   LD      B,ID.EFFECTIVE      ; id to be changed
        LD      C,ID.PROGRAM        ; new id for current process
        JSYS    .SETUSER            ; set id to new id
        LD      C,0                 ; read/write access
        LD      DE,DEVPATH          ; pointer to device
        LD      HL,NODEPATH         ; pointer to pathname
        JSYS    .MOUNT              ; mount file system
        JR      NC,OK               ; if no error goto exit routine
        JSYS    .ERROR              ;    otherwise report error
;
OK      JSYS    .EXIT               ; exit to operating system
;
        END     START
;
```

UNMOUNTA

```
;
DEVPATH DB      '/DEV/FDA',0        ; large floppy drive A
;
START   LD      B,ID.EFFECTIVE      ; id to be changed
        LD      C,ID.PROGRAM        ; new id for current process
        JSYS    .SETUSER            ; set to new id
        LD      C,0                 ; read/write access
        LD      HL,DEVPATH          ; pointer to pathname
        JSYS    .UNMOUNT            ; unmount device from pathname
        JR      NC,OK               ; if no error goto exit routine
        JSYS    .ERROR              ;    otherwise print the error
;
OK      JSYS    .EXIT               ; exit to operating system
;
        END     START
;
```

Terminal Identification

Often it is useful to be able to identify which terminal device is being used when running a program so that it may adapt to the particular characteristics of the terminal or its location. The following illustrates the use of the CROMIX system call **.cstat** that enables this to be done.

This call should be invoked requesting the **st.device** data for the **stdout** channel. The resulting data are the major and minor numbers of the device file corresponding to the terminal port in use. Note that if **stdout** had been re-assigned to a non-device file (e.g., and ordinary file, by redirection), the result is majordevno=0, minordevno=0, and the terminal cannot be identified.

The Z80 call works in both Z80 and D-series (68000) CROMIX, but the equivalent 68000 call does not work correctly. The following is an **example** of using **.cstat;** the result is merely printed. (at bottom)

```
;
*INCLUDE JSYSEQU.Z80
;
START   LD      C,ST.DEVNO      ; desire the device number
        LD      B,STDOUT        ; channel is standard out
        JSYS    .CSTAT          ; get major and minor number
        PUSH    DE              ; d = major  e = minor
        LD      A,D
        AND     0FH             ; extract majornum
        ADD     30H
        LD      B,STDOUT
        JSYS    .WRBYTE
        LD      A,':'
        LD      B,STDOUT        ; separator
        JSYS    .WRBYTE
        POP     DE
        LD      A,E             ; extract minornum
        AND     0FH
        ADD     30H
        LD      B,STDOUT
        JSYS    .WRBYTE
        LD      A,'\N'          ; newline
        LD      B,STDOUT
        JSYS    .WRBYTE
        JSYS    .EXIT
        END     START
;
```

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EDITOR'S NOTE:
The following was excerpted from the CUG Newsletter No. 4, and was originally submitted by the CUG founder, Peter Norman of the Department of Chemical Engineering at Newcastle University.

11 MB Disc Crash—A Cautionary Tale

Last February, our 5-user version 11.11 CROMIX system crashed after messages appeared on the console indicating a large number of hard errors on the 11 Mb Cromemco winchester. This unit had run almost non-stop for a year without any fault and the immediate reaction was "it's happened at last—send for the engineer." To investigate the damage, an attempt was made to reboot the system on a skeleton 8" floppy back-up, but it refused. It was, however, possible to boot up CDOS, so there was no fault in the floppy controller or memory bank zero.

As a first check, 64KZTEST was run in each slice of memory in turn. It was then discovered that one board had suffered a catastrophic failure and that it was the only board that had been active when the crash occurred. Having replaced the faulty board, the system was then successfully booted on the floppies and it was also possible to mount the 11Mb disc. It further proved possible to read much of the disc, demonstrating that the "hard" errors were not due to mechanical failure. Investigation showed that the whole of the /ETC directory was unreadable and generated the error messages seen previously if an attempt was made to read it. It was also impossible to delete /ETC.

Fortunately, /ETC could be renamed (as /BAD) and a new /ETC created. At this point, the system could then be booted as normal, with the winchester as the root device.

So far, it appeared that the situation had been rectified as long as no attempt was made to enter /BAD. Unfortunately, this only continued for a few days before the system crashed again. This time, it happened when a user was creating a file in the editor. The system stuck, with streams of hard error messages pouring uncontrollably up the console screen. The system could be activated again by rebooting and deleting a few files.

We decided the problem was due to corruption of several blocks on the disc (72, 73, and 74 were the only block numbers ever reported in the error messages) and that these blocks contained directory information rather than data. It seems that the system would run normally until it wanted to write directory information for a new file into the bad blocks. Deleting a few files released space on an adjacent good block. Furthermore, it was clear that the corruption had occurred during the initial crash and was caused by the memory fault which was known to have happened while the disc was being accessed.

The Solution: Although we had a backup on (many) floppies, it would have been tedious to rewrite the whole filesystem. The answer was to run INIT on the disc, specifying only the bad cylinder and surface. Having done this, the usual diagnostics (DCHECK and ICHECK) showed a number of files adrift and these were deleted or repaired with the -s option. The operation was, in this case, successful, and the disc was restored to good health in a matter of an hour and a half, using INIT.

The moral, I suppose, is that it probably pays to think for a while and do some simple tests before calling the engineer. It might have cost us a lot of money to have the disc taken to a workshop only to find that there was nothing mechanically wrong. However, if you are tempted to take drastic action such as using INIT, make sure that in the last resort you have a backup available.

Postscript: The failed memory board was found to have a full 16K block out of action, which seemed rather unusual. It was also found to have a thick wad of dust on the bottom edge, above the cooling fan in the cabinet. The board was a DMB 6400 and this has the bank select switches at the bottom of the board. These were covered with dust. Further tests showed that these switches were faulty. After a thorough clean, the board is now functioning normally. The second moral is, therefore, to clean the components in your machine regularly, including the non-moving parts.

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Soft Tips

SOFT TIPS is a regular column aimed at providing software oriented hints and ideas for non-programmers. Members are encouraged to send in tips that can help a user better use his/her system. SOFT TIPS is designed to put forth ideas that are general in nature. The column is edited by Norman Vadnais, President of **Computer Specialists & Associates,** an Orange County Customer Support Specialist. Member's contributions can be sent to SOFT TIPS in care of I/O News. If you wish to discuss your software situation directly with Mr. Vadnais, he can be reached at (714) 841-3620.

Special Introduction

This edition of SOFT TIPS is designed to outline situations run across by the editor in his consulting work on Cromemco computer systems. Each situation has been serviced by his company, Computer Specialists & Associates (CS&A). All utilities mentioned have been packaged into a software product which is available from CS&A.

Throughout this edition are actual problems that have been solved in the field by CS&A for our Cromemco clients. I hope that if you have had to solve similar problems you will find these solutions helpful.

What To Do With A Bad Check

The error "unable to read inode XXXX" is the nightmare of all CROMIX users when they run their **check** utility, especially when further study reveals that the file is an important data file and a backup has not been made in two weeks. What's worse is that there are actually two problems here: First, the media has an error that must be recovered; and second, most methods of recovering from the media error lose most, if not all, of the data within the inode. Believe me, recovery is no piece of cake!

To recover media errors, you must hope the errors are of a temporary nature (i.e., the media is not permanently damaged). If the errors are temporary, Cromemco offers a good set of tools to recover the errors. For floppy disks, the guilty tracks must be reinitialized using the **init** utility. This method will lose all data on the track, so try to get a copy of what you can before init-ing.

For hard disks, the **hdtest** program will take care of any temporary errors. By reading the bad area of the disk and then rewriting it to its original location, any temporary error will be removed. You may also find some of the data written will be in proper working order or that an obvious error pattern allows for easy correction of any problems. Our advice is to rerun **check** to determine what was lost. If no obvious solution is available, the inode will have to be redesigned from scratch.

To redesign inodes from scratch, a list of blocks originally in the inode in question must be developed. Unfortunately, **check** does not provide a list of the missing blocks (the ones it could not find because they should be in your inode), it simply reports the total count. So CS&A developed **missing,** a utility to list the missing blocks on a CROMIX system. The program also tries to point out where the missing blocks came from and how they should be restored. CS&A has a 100% record on restoring CROMIX disks with temporary errors in the inode area, preserving all data.

Keeping Friends Straight

The ability to exchange files between users on a multi-user system is extremely important. This is especially evident in large CROMIX installations where users often need to share select files with select other users. For example, Joan shares accounting files with Fred and word processing files with Mary. Fred also shares the engineering files with Sam, and Sam also has word processing access. And some of them may wish to write documents no one else can see.

The simplest way of sharing files is to make all involved privileged users. This can be dangerous, however, even with a menu handler to protect the unknowledgeable users from the CROMIX utilities. It also offers no privacy for personal files. The ideal solution is to create functional groups for each of the various interests on the system. Then each user with a particular capability would be placed in the group with access to the required files. All files created by a member of a group would be accessible to all members of that group. The theory is nice, but CROMIX does not handle groups well enough to implement this solution.

First of all, CROMIX does not understand users in more than one group. Secondly, there is no way under command file or menu control for a user to change his active group and automatically execute more commands. Lastly, CROMIX as configured at the factory does not allow group members full access to files created by other members of the same group.

CS&A solved this problem by developing their own **group** utility, the utility which allows you to change your active group. CS&A's group utility offers two major advantages. First, CS&A's **group** recognizes users in multiple groups. When a request is made to change groups, no request is made for the proper password of a member of the group. The other advantage is the ability to execute a command line when changing groups. This makes CS&A's group utility useable under command file or menu control, so Mary or Joan above can now be automated.

Show Off Your Bytes

Our staff has often had the need to display on the screen a few selected lines of a file. CROMIX makes this difficult, since **type** displays the entire file and **dump's** character printout is not easy to follow. CS&A has tried to fill this void with a **display** utility. **Display** is simply a type-like command with options to select the proper start and finish of the display.

The options offered by **display** are a beginning or ending byte number, a beginning or ending line number, a maximum number of bytes, or a maximum number of lines. Any combination of these options is allowed, as long as nothing is redundant. This function has proved itself useful numerous times.

Mounting Your Device

Mounting devices to CROMIX is only allowed for privileged users. This was a major blow to a new CROMIX user who came to us with the following problem: They have over 25 users on their system who all load their work from floppies before starting. They were not interested in purchasing a hard disk at the time, so a new way to **mount** disks had to be designed.

CS&A solved the problem by designing their own **mount** and **unmount** utilities. These commands allow disks to be mounted by a privileged user or by any user who has total access to the disk in question. Disks can then be initialized for specific engineers in the company, who can mount and unmount their disks at will.

CS&A also created a handy command for use in unmounting all mounted devices. Normally one must first run **mount** to see what is mounted before they can **unmount** the devices. CS&A's dismount does the work for you, seeing what is mounted and unmounting all

but the root device. This can be a handy addition to the shutdown command file.

dBASE And Cromix

George Tate once called asking if it was possible to spool his dBASE II output to a printer. At the time Ashton-Tate was running its operations off of two six-user CROMIX systems with IOP/Quadarts. We said we were not sure, but would look into it. The next day we called George back to say we had a way to do it. It was crude, but it worked. Today we call it dSPOOL.

Through four major revisions, and countless minor ones, dSPOOL has been refined to offer as many CROMIX capabilities as possible to users of dBASE II. Spooling of all printouts, access to other CROMIX utilities, mode changes, date and time access, and even CROMIX's locking feature are all provided. Many dBASE users around the world have appreciated the extension of their dBASE capabilities.

CP/M Files Under Cromix

As quickly becomes obvious to anyone interchanging files between CP/M or CDOS software and CROMIX utilities, the handling of end-of-file is not the same for the two environments. CROMIX works off of an absolute end-of-file, with a specific byte count. CP/M works with a marked end-of-file, with a counter of the number of logical blocks in the file. When CROMIX reads a CP/M created file, it ignores the marked end-of-file and instead reads all bytes in all blocks, causing some problems during printouts or other functions.

Cromemco has offered **cdosfix** to handle these problems, CS&A offers **clean. Clean** can perform the same function as **cdosfix,** but uses other options to provide more features. Those using a CP/M or CDOS compiler can remove the unnecessary leading and trailing form feeds for their print files, for example. It can also perform various searches for the CP/M end-of-file marker, depending on the type of file involved.

Different Strokes For Different Folks

As seen previously in Tec Tips, it is sometimes convenient to have more than one version of a particular program available on your computer. If you run WordStar, for instance, and have multiple terminals from various manufacturers, a different version of WordStar is needed for each different terminal type. Confusion can arise when the "wrong" version of WordStar is run from a particular terminal, a situation which can often arise in a fast-paced office environment.

CS&A offered one of its clients with multiple terminals a solution to this problem, a utility we call a **branch program.** The branch program determines which CROMIX device you are operating from and then loads and executes the proper version of the program. In this way all users would execute WordStar with the familiar ws. Ws.com is simply the branch program which will execute ws.cro.com, ws.tvd.com, ws.ads.com, or whatever the appropriately configured WordStar is called.

In modifying the program for other clients and even our in house system, many other features have been added. If there is no default version of a program for the device the user is on, he will be presented with the options currently available and asked to choose the one for his situation (this is quite handy for dial-up modems). Proper program types based on login names versus devices is also now provided. And recently, we have automated the process so that our clients can change the branch program, or add new branch programs, by creating a simple parameter file.

Generations Upon Generations

One difficulty all of our clients seem to encounter is the regeneration of their CROMIX every time they receive an update. Often they have entered the wrong response to a question causing devices and/or areas of the disk to be unaccessible. CS&A designed **regen** to avoid this problem.

When a user's configuration has not changed, the new CROMIX should be generated to match the **crogen** responses of the previous version. CS&A's **regen** reads the old version of CROMIX to determine the parameters used to create it and then runs the **crogen** utility for the user, answering the questions for him. This way there can be no mistakes, and no surprises later on.

Multiple Files, One Command Line

Have you ever attempted a global rename under CROMIX? You never get quite what you are after, if you get anything at all. There are other times where one wishes to execute the same CROMIX command line on a long list of file names. 68000 CROMIX offers the **retype** mode to help in this area, but it is not always easy and is not available to Z80 CROMIX users. CS&A's **fork** utility offers some assistance in this area.

For the renaming problem above, CS&A's **fork** utility is called with a skeleton command line, with markers denoting the desired location of the filename (assuming an extension is being renamed). The syntax of the skeleton command line is exactly the same as in the **find** utility. Each file name would be provided one at a time by either the user or by a redirected input file with one line per file name. Each line of input is inserted into the command line in place of the marker and then the command line is executed. A blank line, or end-of-file, will end the forking process.

Anything can be substituted in for the marker, as long as the resulting command line makes sense to CROMIX. Not having to retype a command line over and over is always a pleasant relief.

Your Problems/Solutions Are Welcome

If you have come across any problems and/or solutions like those above, please pass them along to SOFT TIPS in care of I/O News. If you wish to transmit your information via modem please contact the editor to make the necessary arrangements for the transfer.

tec·tips

TEC TIPS is a regular column aimed at providing hints for keeping systems up and running. It will not attempt to deal with specific engineering applications or non-standard configurations. TEC TIPS is edited by Richard Quinn, owner of QUINTEC, a Southern California Computer service firm.

Converting a CS-3 to a CS3A, or "Out with the Persci, In with the Tandon"

Many who have the old Persci disk have wanted to replace them with the newer Tandon or Shugart disk drives. There are a lot of good reasons to do this. The price is lower for the non-Persci drives and they are more reliable. In addition Persci is all but out of business and parts are expensive and service is long.

This Tectip is devoted to those who want to convert their System Threes to other than Persci drives. It is not an easy task and if you do not have some basic skill in electronics and metal working you might find it better to consult a service center that has experience.

Basically you will be turning your 16FDC into a 16FDC-T. you can use only a 16FDC, no 4FDC's. If you have a 64FDC you are probably not using any Persci drives. If you have only a 4FDC than I recommend purchase of a 64FDC so you will not have to buy a 16FDC and convert it. Also the 64FDC is $100 cheaper than the 16FDC.

The 16FDC-T floppy disk controller board may only be used with the following versions of Cromemco software:

Cromix Operating System version 11.11 or higher
CDOS Operating System version 2.53 or higher
Init utility version 2.71 or higher
Diskdiag utility version 00.12 or higher

The new single 8" disk drives require new, foil-backed single-side/ double-side index hole cover labels. The old paper-backed labels may cause errors. The new labels can be identified by peeling off the paper backing to expose the label's sticky surface. This surface is silver on the new labels. It is white on the old labels.

The modification to the 16FDC will do two things: 1) It will make the card compatible with the Tandon- or Shugart-like drives, and 2) It will improve the data separator for use with those drives. Again, these mods are extensive and should only be attempted by an experienced technician.

To convert your 16FDC to a 16FDC-T make the following changes:

1. On the component side, cut traces from J3 Pins 2, 4, 10, 14, & 24.
2. On the solder side, cut traces from J3 Pin 18 and IC11 Pins 2 & 14.
3. Jump IC11 Pin 6 through Hole #7 (under IC26) to IC26 Pin 29.
   Jump IC11 Pin 7 through Hole #8 to J3 Pin 2.
   Jump IC11 Pin 13 through Hole #1 to J3 Pin 4.
   Jump IC11 Pin 2 to IC11 Pin 13.
4. Jump IC9 Pin 7 (Hole #3) through Hole #4 to J3 Pin 30.
   Jump IC9 Pin 9 (Hole #5) through Hole #6 to J3 Pin 32.
5. Jump IC40 Pin 7 (Hole #2) to J3 Pin 14.
6. Jump IC6 Pin 7 to IC11 Pin 14; jump IC6 Pin 9 to IC32 Pin 1.

The following changes should improve the data separator on your 16FDC. You may want to test the card BEFORE you make these changes to confirm that the above work is okay. In addition, many cards will work fine without these changes. Because of the technical nature of these changes, PROCEED WITH CAUTION! To change the range of the data separator do the following:

1. Add a 39K resistor across Pins 2 & 7 of IC2.
2. Jump IC5 Pin 1 to IC5 Pin 5.
3. Change R1 from 5.49K to 2.74K.
   Change R2 from 2.67K to 1.27K.
   Change R11 from 1K to 499.
   Change R13 from 1K to 330.
   Change R26 from 3.92K to 2K.
   Change R27 from 1.24K to 2K.
4. Remove R12 20K; add a 10K resistor from IC1 Pin 4 to the R12 hole next to R13.
5. Replace RN1 (003-0042) with five discreet resistors.

Remove the old Persci 299 drive. Leave the data cable from the 16FDC. It will be used again on the Tandon drives.

Power for the Tandon is +5 volts and +24 volts. The 5 volts can be obtained from the Persci power supply in the back corner of the System Three. If you are installing only one Tandon drive (like the current CS-3As with hard disk drives) you can pull the 24 volts off of the same supply. If however you are installing a pair of Tandon drives, I have found that the 24 volts can be used directly off of the unregulated 18 volts of the computer supply. Trying to run two drives off of the Persci 24 volts will cause the system to die as soon as the drive motors start. This is because so much power is drawn off the 24 volts on the Persci supply, which also powers the AC line voltage relay. Hence the whole system dies when the 24 volts drops.

If you are powering off the 18 volt line, check it to see that it is at least 19 to 20 volts with all cards in the system. If it is not, re-strap the AC power transformer to raise this voltage. The 24 volts runs the motor and the stepper in the Tandon drives. If the +24 volts is too low you will get a slow start in the motors or the stepper will get "lost" on long seeks. A CLEAN DRIVE PROPERLY ADJUSTED IS A MUST FOR THIS TO WORK CORRECTLY. **Diskdiag** is the best program for testing the drive and you may want to run a test before making the system changes.

If you do not want to run the drives off of the 18 volt supply and would feel better with a separate power supply, you can choose to do this. Also if you are good, there are ways to beef up the 24 volt Persci supply. But I have found that the Tandon drives work fine if properly aligned, with CLEAN rails on the heads and a stable 5 volt supply. I have not seen any that would not work properly down to 19 volts. The "E" series of TM-848/2 Tandon drives is best as the motors are direct drive and not at all sensitive to the 24 volt line. HOWEVER, there were a lot of them made with grease on the rails (this has to be cleaned off) and poor firmware in the microprocessors. If you get one of these, consult an experienced Tandon technician to solve the problems. Symptoms include getting lost on long seeks and a "flashing" select indicator lamp on power up.

Remove the push buttons from the bottom of the front door.

Remove all cables back to the power switch PCB card.

Remove the front door from the computer. Carefully lift the metal plate around the diskette slots on the front of the door. Try not to bend this plate. It is installed with double stick tape and sometimes heat from a hair dryer helps. Cut the aluminum die cast metal out behind the plate. This is best cut with a metal blade in a sabre saw. Cover the front of the door with masking tape to protect against scratches. Cut the hole big enough for both drives to protrude without hitting the edges. You can over cut this by a quarter inch or so because the trim plate will make the fit close.

Mount the floppies to the left of the drive cage so that the front of the drives are flush with the front of the door when closed. Mount them from the top with a metal strap. The screws on the bottom will not catch any metal.

Using a ruler, lay out a close cut edge for the metal plate removed in step 4 above. Cut or file this close so it will make a nice close edge when the door is closed. The front of the drives should be flush with the front of the door. Protect the plate with tape as you cut it. Again, I use a sabre saw with a metal cutting blade to do this. If you are not good with metal, good luck!

With drive A on the left and drive B on the right, install the power connectors and data connectors on the backs of the drives. Be certain the power is off and that the termination resistor pack is in the last physical drive on the data line. There should not be any other termination resistors.

Before starting, pray, pour a cup of coffee, and keep the bandaids handy.

If you don't feel comfortable with this work but want it done, our charges are $1300 in our shop and it will take about 1 to 2 weeks for all work.

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Sales, Service, Integration, Installation, and Innovation — these are key words to describe MCM Enterprises. MCM is a full service computer solutions company with consulting, equipment, software, training, and service. MCM carries a full line of Cromemco Systems, NEC, Epson & Okidata Printers, Lear Tristar, Peachtree, Micropro (the WordStar People), ProCall Communications Software, and other specialized software. MCM Enterprises also offers full service on NEC Spinwriters, PerSci floppy drives, and all Cromemco equipment. MCM offers a variety of equipment and program service agreements. MCM also custom configures systems for international power requirements and has full export services. Call for training on CDOS, Cromix and languages, as well as hardware.

Key Personnel: M.C. Merchant (MSEE), Owner
T. Bidstrup, Sales
M. Ridgway (MS), Program Service
R. Blaylock, Equipment Service
M. Nadaire (MSEE), Mgr. Paris Office

Major Market Area:
Sales: San Francisco Peninsula & Nevada extending internationally.
Service: S.F. Peninsula and Nevada extending into N. California.
Paris Office: 4 Rue Paul Bert
92150 Suresnes, France
Tel (1) 506 33 03 TLX 610994F

MULTI-MEDIA VIDEO INC.
3350 Scott Blvd., Bldg. 21
Santa Clara, Ca. 95051
Tel: (408) 727-1733
Tlx: 171-577 MMV USA

Multi-Media Video, (MMV), markets bilingual Arabic/English Cromemco systems and peripherals throughout the Middle East. Installations have been made in the government and banking sectors; a complete Arabic banking system was developed for the latter.

Key Personnel: Ursula Burger, President
Michael Laugesen, Sales Manager
Clarissa Clayton, Marketing Manager

Major Market Area: Authorized dealers in Egypt, Saudi Arabia, and Pakistan.

Mid United States

ASGARD COMPUTING EQUIPMENT, INC.
121 West 6th Street
Neillsville, WI 54456
(715) 743-3344

823 5th Street
Menominee, MI 49858
(906) 863-6733

Exclusive Cromemco dealer with long term Cromemco association. Office includes on staff Engineers, Accountants & Chemists.

Key Personnel: James L. Bailey, President
Jerry Hagen, Vice President/P.E.
Ed Baetke, Secretary/Treasurer/Chemist

Major Marketing Area: Upper peninsula in MI, Northern & Western WI, Eastern MI.

COMPUTER CROSSROADS OF AMERICA, INC.
6 Terrace Shopping Center
Richardson, Texas 75081
(214) 231-6108 Twx/Telex 4991118

We are a CROMEMCO MASTER DEALER engaged in DEALER and OEM sales, service and support. We are in the top twenty-five dealers in the U.S. We have a consulting staff comprised of specialists in hardware, software and applications engineering. We are presently engaged in sales from the hardware level (equipment and/or software delivered in an unupened box) through the complete systems level where we take full responsibility for the system hardware configuration, instruction and maintenance of a system. As our name implies THIS IS THE CROSSROADS WHERE IT ALL COMES TOGETHER.

Key Personnel: Ed Fearon, Sales & Support
Danney Jarman, Sales & Support
Mark Shepheard, Sales
Bill Carnahan, Support

Major Market Area: Sales & Service Worldwide

TRADEWIND SYSTEMS
Box 96, West Highway 54
Liberal, KS 67901
(316) 624-8111, IN KS 1-800-362-9000
Outside KS 1-800-835-2057

Exclusive Cromemco dealer, specializing in complete business systems. Provides consulting services. Full inventory.

Key Personnel: David Fuller, Store Manager
Ray Cole, System Development
Kevin Elmore, System Development
Clark D. Stewart, President
Wayne Stewart, Vice President

Major Market Area: Sales: S.W. Kansas, extending to Colorado, Kansas, Oklahoma, Texas, New Mexico.
Service: S.W. Kansas

SYNERGISTICS INTERNATIONAL LTD.
35 Fountain Square Plaza, Suite 207
Elgin, IL 60120
(312) 695-7775

Full inventory of Cromemco hardware and software. Custom software developed in-house. Vertical market packages available include: Chiropractic Clinics; Architectural Woodwork Job Costing; Social Service Agency Accounting; Auctioneering. Specializing in providing turnkey systems to small and medium sized businesses.

Key Personnel: Jim Knowles, Pres. (Sales)

Major Market Area: Sales: Chicago and suburbs, extending to entire U.S. and the U.K. Service: Chicago and suburbs.

Eastern United States

CCS, INC.
A Computer Services Company
733 Third Avenue
New York, NY 10017
(212) 986-7520

Large Cromemco OEM specializing in custom applications on Cromemco Hardware. Full range of services including hardware sales, rentals, long and short term leasing, custom programming and continuous hardware and software support. Specialists in database and large scale financial applications.

Key Personnel: Richard Levey, Vice President
John Ruffo, Vice President

Major Market Area: U.S. and Major cities throughout the world.

COMPUTER CLOSET INC.
45F Route 303
Valley Cottage, NY 10989
(914) 268-5161

Complete systems house providing sales, service and support for the full line of Cromemco hardware and software. Provides system planning and design for custom applications in business, education, and professional fields. Regular schedule of seminars and training classes offered.

Key Personnel: Rick Townsend, President

Major Market Area: Sales: Northeast U.S. and East Coast
Service: Continental U.S.

COMPUTER SYSTEM & TECHNOLOGY, INC.
226 Sherwood Avenue,
Farmingdale, NY 11735
(516) 420-1470

Cromemco dealer since 1980, we are known for our resourcefulness and good service. We specialize in 68000/UNIX computers, database, and graphic. Among the products we develop are a graphic workstation for CAD application, and the RETAIL CONTROLLER™ that connects the cash register to the computer for inventory control, sales analysis, and cash management. Key personnel have strong background in engineering, financial markets, and import/export trade.

Key Personnel: Mike Fung, President
Fanny Ho, Manager
Salina Ho, Project Leader

Major Market Area: New York, extending to entire U.S., Canada, China, Europe, and South America

CUSTOM COMPUTER SPECIALISTS, INC.
300 Vanderbilt Motor Parkway
Hauppauge, NY 11788
(516) 231-1155

Full service systems house with retail showroom. Full line of Cromemco hardware, software, accessories, and literature. Provides warranty service, diagnostics, consultation, systems analysis, and custom programming. Special management software for attorneys, mass transportation scheduling, reservations, delivery manifests, education, small business.

Key Personnel: Gregory G. Galdi, President
Linda M. Miller, General Manager

Major Market Area: Sales: Northeast U.S., extending to East Coast.

Service: East Coast extending to Continental U.S.

METRO COMPUTER
Division of F.S.L. Corp.
110 Harvard Street
Brookline, MA 02146
(617) 277-5115

A complete service and support dealership committed to a full line of Cromemco products. Services encompass custom designed hardware and software for individual interfacing needs such as communications applications, multi-vendor configurations, add-ons, and upgrades. All Cromemco systems on display and available for hands-on demonstration, including color graphics system. In addition to on-site warranty repairs, extended maintenance is offered on either an hourly basis or by contract.

A wide range of software and peripherals compatible with Cromemco systems is available. Metro Computer specializes in office productivity, accounting packages and specialty markets. The consulting division of F.S.L. Corporation emphasizes DESIGN AND ENGINEERING for the INDUSTRIAL and DEFENSE area. Our staff of engineers and technicians are standing by for customer support.

Other Lines: Apple, Hewlett Packard

Key Personnel: Frederick S. Lebow, C.E.O. (Engineer)
Dwight Calhoun, Director of Engineering
Robert J. Durante, Vice President of Finance
Melissa Lavers, Sales Manager
James Ritteman, Technical Support (Sales)

Primary Marketing Area: Massachusetts
Extended Marketing Area: New England States

SYSTEMS ATLANTA, INC.
P.O. Box 99
Highway 5, Toonigh Road
Lebanon, Georgia 30146
(404) 928-0240

As one of Cromemco's oldest dealers, Systems Atlanta is well experienced in hardware and software implementation. With over 1000 systems installed and a full staff of highly seasoned employees, Systems Atlanta offers technical support for operating systems, application software and hardware design. Specific configurations include telecommunications, graphics, data base management as well as fully integrated accounting systems. Systems Atlanta has authored several specific applications packages such as Manufacturing and Inventory Control, Church Management, Job Costing and Unix based programs.

Key Personnel: Charley Dobson, President & G.M.
Betty Dobson, Dir. of Finance & Admin.
Gary Kendrick, Dir. of Marketing
Steve Garrison, Operations Manager

Major Market Area: Worldwide, with exports to South America, Europe, the Middle East and Canada.

Canada

COMPUTER SOLUTIONS
1700 Varsity Estates Drive N.W.
Calgary, Alberta
Canada T3B 2W9
(403) 286-8459 Telex: 03-827506

Complete sales, service and support center for Cromemco and a variety of quality peripherals and support products. Specializing in support over long distances, OEM accounts, custom software, solutions to computing concerns.

Key Personnel: Bob Pyle, General Manager
Mark Dutchuk, Customer Support
John Shepherd, Sales Manager

Primary Marketing Area: Western Canada
Extended Marketing Area: Eastern Canada, Northern/ North-Western U.S.

D.E. SYSTEMS LTD.
1284 Wellington St.
Ottawa, Ontario
Canada, K1Y 3A9
(613) 729-5164

D.E. Systems Ltd. is a full service company offering Cromemco Hardware, Software Development, Education and Application Programs. We have developed integrated Inventory, Point-of-Sale, Invoicing, Accounting and Sales Analysis programs as well as a Courier Package. We specialize in Cromemco Computers for government and small businesses. We have most Cromemco products in stock and offer technical support on the hardware and software. We offer maintenance of all Cromemco equipment and related peripherals.

Key Personnel: Bruno Dugas, President
Keith Corkum, Director (Systems Development)
Dwight Presley, Senior Analyst

Major Market Area: Eastern Canada

Mexico

SOPORTE ADMINISTRATIO COMPUTACIONAL, S.A.
15 de Mayo 1111 Pte.
Monterrey, N.L., Mexico
Tels. (83) 43-83-40 and 44-62-69

Complete line of Cromemco hardware and software in inventory. Specializing in Business with Software packages (in CROMEMCO Structured Basic) in Spanish according to Mexican Laws and Taxes including Accounting, Payroll, Accounts Receivable and Payable, Inventories, etc., provides full service facility, including technical consulting, custom software, warranty and repair.

Key Personnel: Juan Angel Perez, Director
Luis Ernesto Rodriguez G., Marketing
Delfino Juarez, MSEE Technical Support

Major Market Area: Northeast Mexico

International

Europe

Middle East

MICRO COMPUTER SYSTEMS MARKETING CENTER
P.O. Box 1446
Jeddah, Saudi Arabia
(966) (2) 651-7707 or 653-0580/Telex 928-403068 MICSYS SJ

Authorized Dealer in Jeddah-Saudi Arabia (Western Zone) for Cromemco sales and maintenance of computers, peripherals, software development and design. Strong Arabic Software development.

Key Personnel: Abdul Rahman H. Attar, General Manager
Issam Al Safadi, Administrative Manager
M. Ali Khan, Marketing Executive

REALTIME ENGINEERING & DATA ANALYSTS
P.O. Box 278
Dhahran Int'l Airport
Dhahran, Saudi Arabia
(966) (3) 8649043/Telex: 928-670480 READAK SJ
P.O. Box 6156
Jeddah
Saudi Arabia
(966) (2) 6531502

Sales and maintenance of computers, peripherals and supplies within the areas of automation, industrial, business and office. Security systems. Strong in developing ARABIC SYSTEMS (hardware and software) and turnkey projects. Large simulators and facsimile.

Key Personnel: A.A. Salamah, Administrative Director
Nasir Jamil, Manager Digital Systems Div.
Ziyad Ismail, Software Design and Development

Major Market Area: CROMEMCO distributor for Middle East (Saudi Arabia, Gulf Emirates, Iraq, Syria, Jordan, Lebanon)

Far East

ASAHI GLASS
Electronics Group
Special Products Marketing Div.
1-2 Marunouchi, 2 Chome
Chiyodaku, Tokyo 100
Japan
781-24616/Telex: 24616 ASAGLAS

Complete line of Cromemco hardware and software in inventory. 700 sq. foot training room. Specializing in O.S. modifications. Full service facility, providing technical consulting as well as warranty repair service.

Key Personnel: Shigeo Satoh, General Manager (systems)
Norimasa Hori, Manager (sales)
Shinichi Watanabe, Tech/software

Major Market Area: Japan

NCC INTERNATIONAL
Matsunaga Bldg. 1-6-6 Sotokanda Chiyodaku Tokyo 101 Japan 03-(255)7991 / Telex: 781-2523758 KKSHIP J

The oldest microcomputer store of the Byte Inc. Group, ofering CROMEMCO to Japan since 1977.
This company primarily sells CROMEMCO equipment, and provides high technology and comfortable customer service.

Key Personnel: Kiyotake Ikeda
Ryuichi Kawase

Major Market Area: Japan

SUPER-NATURE COMPUTER CO., LTD.
4F-1, No. 239, Ta-An Road, Sec. 1
Taipei, Taiwan. Republic of China.
(02) 705-2442, (02) 700-4858/TELEX: 13937 SNCOMPUT

Our Company primarily sells CROMEMCO computer equipment with high technology and experience, providing installation, warranty repair service and customer education.
Specializing in O.S. modifications, software and hardware development for business and industrial applications.

Key Personnel: Miss Su-Chin Kuo, President
Mr. Mark Yeh, Sales manager
Mr. Morgan Chen, Import/Export department
Mr. Ringol Shiung, Chief of R&D department

Local Cromemco User's Groups

Arizona Association of Cromemco Users
Contact: Jo Ann Drake, President
2207 West Eugie Avenue
Phoenix, AZ 85029
(602) 993-9589

Bay Area Cromemco Users & Programmers (BACUP)
Contact: Raymond Barglow or Alan Walworth
United Word & Data Processing
2345 Fulton Street
Berkeley, CA 94704
(415) 841-0708 or (415) 548-2692

Cromemcohorts
Contact: Dr. Brent Lowensohn
4747 Sunset Blvd.
Los Angeles, CA 90027
(213) 667-8972

Cromemco Users' Group Holland (CUGH)
Contact: Joop Kohler, Secretary
P.O. Box 120
2910 AC Nieuwerkerk a/d IJssel
The Netherlands 01803 - 3300

Cromemco Users' Group
Contact: Peter Norman
The University of Newcastle Upon Tyne
Department of Chemical Engineering
Merz Court, Claremont Road
Newcastle Upon Tyne NE1 7RU
England
Newcastle 28511, Ext. 3278
*Publishes Cromemco Users' Newsletter (CUG)

Cromemco Users' Group Ontario, Canada
Contact: Lloyd Parker
Hiram Walker Resources Ltd.
Suite 600
1 First Canadian Place
Toronto, Ontario
Canada M5X 1A9
(416) 864-3349

Cromemco Users of Orange County, California
Contact: Michael Peterson
Accountability Systems
700 South Tustin Avenue
Suite B
Orange, CA 92667
(714) 639-4570
Meets third Tuesday Monthly

Insystems Pty. Ltd.*
Contact: Norman Rosenbaum
337 Moray Street
South Melbourne, Victoria
3205 Australia
(03) 690-2899, telex AA30458
*Publishes "Cromemco UPDATE a bi-monthly newsletter

Illinois Users' Group
Contact: Jim Knowles
P.O. Box 631
Elgin, IL 60120
(312) 695-7775

Indonesian Cromemco Users' Group (ICUG)*
Contact: Zafir M.A. Pontoh
Computation Lab
Department of Regional & City Planning
Bandung Institute of Technology
10 Ganesha
Bandung, Indonesia
(022) 82051 ext. 360
*Publishes "BERKALA ICUG," a monthly newsletter

Microcomputer Users' Group
Contact: Jim Lenz
1165 Barbara Drive
Cherry Hill, NJ 08003
(609) 428-6701

Northwest Association of Cromemco Users (NWACU)
Contact: Jim Illman
403 S. Brandon
Seattle, WA 98108
(206) 763-2099

North San Diego County Users' Group
Contact: Charles Mackey
P.O. Box 397
Fallbrook, CA 92028
(619) 728-6116
Located 30 mi. east of Oceanside

North Texas Cromemco Commercial Users' Group
Contact: Jerrell Johnson
1131 Winterwood
Lewisville, TX 75067
(214) 221-1437
Or call Rocky Hall
@ (214) 398-1595
Meets first Wednesday bi-monthly

NY, NY Users' Group
Contact: Charles Perrella
45F Route 303
Valley Cottage, NY 10989
(914) 268-5137

SaCromemco Users
Contact: Alan Whitman
Box 244
Rancho Cordova, CA 95670
(916) 635-6070

Silicon Valley Cromemco Users
Contact: Alan O'Neill
(415) 969-3854 or Emily Ott (415) 854-5818
Meeting place provided by:
MCM Enterprises
215 Hamilton Avenue
Palo Alto, CA 94301
Meets second Tuesday monthly

W.A. Cromemco Users' Group
Contact: Rae Canning
c/o The W.A. School of Computing
2/294, Rokeby Road
Subiaco, Western Australia 6008

West Germany Users' Group
Contact: Glynnis Long
Tesco GmbH
P.O. Box 10
8714 Weisentheid
West Germany
09383-1237
Total fluency in English & German

Wisconsin Cromemco Users' Group
Contact: Bob Ungemach
6249 West Browndeer Road
Browndeer, WI 53223
(414) 355-1451

Local User Group News...

Announcing Two New Groups

The Eastern Wisconsin Cromemco Users' Group, which was formed some four months ago, now has 20 active members and is hoping for more. One of the group's projects is conversion of their 3102 terminal CRTs from black & white to green. This requires a new CRT, but the cost for the total conversion runs members only about $90.00. They've also gotten into conversion of WordStar from CP/M, providing new keyboard overlays for their terminals, and other helpful projects. For information on meeting dates and places, contact:
Bob Ungemach
6249 W. Brown Deer Road
Brown Deer, WI 53223
Phone: (414) 355-1451

The other new group, still in the formation stages, is the North San Diego County Users Group, located in Fallbrook, California. Fallbrook, for those not familiar with it, is 30 miles inland from Oceanside, in the heart of one of the most explosive growth regions in Southern California. This is a golden opportunity to get in on the ground floor of a new group in a dynamic area. For information contact:
Charles Mackey
P.O. Box 397
Fallbrook, CA 92028
Phone: (619) 728-6116

* * *

Tri-County NY Group Announces PD Library

Charles Perrella, founder of the only Cromemco users' group near the Big Apple, announced that the club's library of Public Domain software now has over 2,000 programs, made available to all of the club's members on request.

Topics at recent meetings included the new UNIX systems, the 50-Mb drive and tape unit, and a demonstration of "Graph10," a graphics package for the C-10. Anyone interested in club activities can contact Perrella at:
Charles Perrella, Inc.
(914) 268-5161

* * *

Crohorts Plot Activities

A useful topic headed the list at a recent meeting of the Los Angeles based Crohorts: The *Plotware* plotting package. Sounds interesting. We'd like to hear more about it. If you would like to involve yourself in this group's activities, contact Dr. Brent Lowensohn at (213) 667-8972.

* * *

A String of Cs at MUG Meetings

MUG, the South Jersey/Philly area group, is devoting its next few meetings to some serious topics: CDOS/Cromix device drivers, programming C-10 function keys, and the 'C' language. Plans for the coming year were discussed at a recent weekend-long meeting in historic and picturesque Cape May, New Jersey. These are the folks who really know how to combine computers with fun. If interested in affiliating, write: Microcomputer User's Group of New Jersey, Delaware & Pennsylvania, P.O. Box One, Cape May, New Jersey 08204-0001.

* * *

More 'C' at OCC

The Orange County (California) Cromemco User's Group, which meets at Accountability Systems in the City of Orange, decided to put their recent 'C' language classes into practice by rewriting some BASIC software into UNIX-adaptable programs. This group meets the third Tuesday of each month. Contact Mike Peterson for details at: (714) 639-4570.

bits & bytes, nibbles & tweaks

Earlier this year, several technical questions were generated by Peter Z. Ingerman, a long-time member and frequent contributor to I/O News. The questions were sent to Cromemco, and were replied to by Winthrop A. Stiles, III, Technical Publications Manager. Peter Ingerman then sent us a reprint of Mr. Stiles' replies.

We selected some of these for their probable levels of interest to members, as well as the frankness and expertise with which Mr. Stiles responded to the questions. The items noted as "Comment" are from Mr. Ingerman's original letter, and those under "Response" are Mr. Stiles' replies.

Comment:

The RDOS Instruction Manual, published in 1978, which I received with my 4FDC manual, contains a listing of the assembly language version of RDOS version one. The 16FDC manual, which might logically be construed as the successor to the RDOS manual combined with the 4FDC manual, does not contain a listing of RDOS.

Response:

The RDOS listing you need is enclosed with this letter.

Comment:

Since the RDOS listing is the only 'teaching' document that Cromemco has seen fit to provide with respect to the actual manipulation of the disk controller, I view your failure to continue to provide the assembly language coding for the new versions of RDOS as unfortunate, at least for those of us who are seriously engaged in system-level programming.

Response:

It is current Company policy to not routinely provide source code (assembly language coding) for Cromemco software. It is a time-consuming and expensive process to produce. We typically charge for this service. The RDOS program is rather short and simple, thus it is not as difficult to provide as most of our software programs.

Comment:

I am unable to find any information as to when Cromemco began using the IEEE-696 S100 bus. I do know that I have a Cromemco system 3, ...and bus pins 53 and 70 do not appear to be connected to ground.

Response:

Cromemco uses pins 20, 50, 70, and 100 for grounds. Pins 20 and 70 were IEEE additions that redefined the memory protect and unprotect lines that were no longer in use. Pin 53 was also redefined; however, this line, originally defined as -Sense Switch Disable, is still required for support of older machines with "front panels." The ZPU is widely used in such machines, and therefore retains the original function of pin 53.

Although pins 20 and 70 have been hooked directly to DC ground in the latest versions of the 21-slot Blitz bus (as used in the CS-3A), earlier versions, such as yours, use pins 20 and 70 as signal lines. The benefit of the extra ground pins is not lost, because the added lines provide a low-impedence return path for signals running between boards; this function does not rely on a path to DC ground. Cromemco boards already exhibit a low-impedence return path for on-board signals due to the extensive use of bypass capacitors and "gridded" power distribution traces.

Comment [Question]:

Is it possible to provide a list of board versions and modification levels at which the various Cromemco boards became compatible with IEEE-696?

Response:

It would be difficult to identify when particular board versions became compatible with the IEEE-696 specification. Here's why: The intent of the IEEE standard was to recognize officially the original MITS bus specification, to resolve existing conflicts in later signal assignments, and to suggest solutions for current and future problems. The intent was never to redefine the bus, but to rationalize its specification. Therefore, our boards, in a sense, always were compatible with the standard; the official specification only formalized what already existed.

There have been, however, minor changes, such as the description of the ground pins discussed above, and these changes have been added to older boards in the course of normal revisions. It should be noted that the presence or absence of these minor changes should not affect the operation of the boards. The major contribution of the IEEE-696 specification was the development of a compatible method of handling 16-bit data transfers in a 24-bit address field. We have complied with this standard in all our 68000 board family designs (e.g. DPU, MCU/MSU, 256KZ, and so on), and we will continue to support it in the future.

Comment:

The CDOS operating system manual for version 1.07 contains (pages 93 through 102) tables for converting between clusters and sectors. These do not appear in later versions of the CDOS operating system manual, and I do not have them for anything other than single-side, single-density disks. In mid-April, I asked Dick Kaye if he could get additional tables for me, and I have not heard from him.

Response:

There are no convenient tables, such as those you referred to, in the CDOS Operating System Manual, for double-sided, double-density diskettes; however, the following information should allow you to calculate whatever conversion you wish. Since you have not identified the size of diskettes you use, I will include information for both 8" and 5" formats.

The CDOS Operating System determines the type of diskette by using a disk type specifier, stored in the first sector of the diskette (sector 1, cylinder 0, side 0). This specifier consists of the 121st through the 128th bytes of this sector (numbering from byte 1 at the beginning of the sector). The specifier comprises four groups of two bytes each that contain the ASCII values of the

TABLE A

	Cyls	Sects	Sect Size (in bytes)
8" Diskettes (single- or double-sided)			
CDOS large, single-density	77	26	128
CDOS large, double-density*	77	17	512
5" Diskettes (single- or double-sided)			
CDOS small, single-density	40	18	128
CDOS small, double-density	40	10	512

* The first track (cylinder 0, side 0) of all diskettes is initialized as single-density with 128-byte sectors by the Init program to allow the disk to be booted with old versions of RDOS.

characters in the table below.

TABLE B Disk Type Specifier

Bytes	Characters	Meaning
121st, 122nd	LG	CDOS 8" diskette
	SM	CDOS 5" diskette
123rd, 124th	SS	Single-sided
	DS	Double-sided
125th, 126th	SD	Single-density
	DD	Double-density
127th, 128th	Reserved for possible future use.	

CDOS diskettes are divided into two distinct areas: the system area, which stores the boot-up routine, and the file area, which stores the directory and all files. The system area includes all or part of the first 1, 2, or 3 track(s) of the diskette, depending on the diskette type. The space reserved for the system area is always at least 6.5K. On double-density diskettes, part of the system area may be stored on a single-density track (cylinder 0, side 0), and part on a double-density track (cylinder 0, side 1).

The file area starts at the beginning of the next track following the system area. (CDOS accesses diskettes by alternating sides or surfaces as it works its way toward the center of the diskette, by increasing cylinder numbers, so the "next track" may be a different track of the same cylinder.) The directory always begins at the beginning of the file area (i.e., the first 1K of directory space is always on the first track of the file area), but other parts of the directory may be elsewhere on the diskette. The information just presented is summarized in the following table:

TABLE C CDOS Diskette System and File Areas

Diskette Type	System Area*	File Area Begins
8" Diskettes		
Single-sided, single-density	c0,s0;c1,s0	c2,s0
Single-sided, double-density**	c0,s0;c1,s0	c2,s0
Double-sided, single-density	c0,s0;c0,s1	c1,s0
Double-sided, single-density	c0,s0;c0,s1	c1,s0
5" Diskettes		
Single-sided, single-density	c0,s0;c1,s0;c2,s0	c3,s0
Single-sided, double-density	c0,s0;c1,s0	c2,s0
Double-sided, single-density	c0,s0;c0,s1;c1,s0	c1,s1
Double-sided, double-density	c0,s0;c0,s1	c1,s0

* c0 means cylinder number 0; s0 means side or surface number 0.

Comment:

The Cromemco text editor does not document either the "?" command, or the "M" command.

Response:

The ? command is used to print a list of all commands. The M command is used for multiple sets of commands:

–M command sets up a command line.

+M command executes the commands.

In addition, I should add that you seem to assume there is a simple answer to your question, "For each of the Cromemco boards, at what version and modification level is it the case that such a board may be plugged into a standard IEEE-696 S100 bus, in an otherwise non-Cromemco environment that is completely compatible with the IEEE-696 S100 bus standard, with the expectation that board will operate properly in that environment?"

I believe that the information presented in this letter should indicate to you that there is no simple answer.

The current IEEE-696 Standard is a de facto standard that has been legitimized officially. Merely because the "standard" exists, does not guarantee in any way that equipment from different manufacturers will be 100% compatible. This identical situation exists for other IEEE standards as well. For example, the "Standard" RS-232 signal definitions do not preclude any manufacturer from slight variations from the "Standard," yet still having equipment that is considered "Standard." I realize your frustration. After all, a standard should be just that —standard—but the reality is that it is not. Cromemco tries very hard to make its equipment as "standard," yet versatile as possible, but non-standard is rampant in the computer industry, of which we are only a part.

I hope you find the information presented above helpful. Should you need additional information, please feel free to contact me.

Sincerely yours,
Winthrop A. Stiles III
Technical Publications Manager
Cromemco, Inc.

**Single-sided, double-density diskettes are permitted, but non-standard.

In addition to the above information, presented below are some light mathematics that you can use to calculate the cluster-to-sector values you need.

(Cluster No.) × 4 = SECTOR OFFSET

Take the integer result of:

$$\frac{\text{SECTOR OFFSET}}{20}$$

to get the TRACK OFFSET + 1

The remainder from

$$\frac{\text{SECTOR OFFSET}}{20}$$

is the offset, in sectors, from the beginning of the track.

If the remainder +1 is 1 to 10, then it's side 0, and the sector = Remainder +1. If the remainder + 1 is 11 to 20, then it's side 1, and the sector = Remainder + 1 – 10.

* * *

New Modem Works with C-10 & TeleMaster

A relatively low-cost modem, the BYTCOM 212AD Modem has been successfully interfaced with the C-10 computer. This modem is menu selectable when coupled with Cromemco's TeleMaster communications software. A spokesman at BYTCOM indicated that of the two available modems that are menu-selectable by the software, only the BYTCOM allows a user to remotely boot the system, store names and numbers, display a "help-menu," and utilize security functions.

The BYTCOM has a guaranteed two-year, swap-out warranty, and carries a suggested list price of $495.00. Users seeking further information can contact BYTCOM, Inc. at (800) 227-3254. Users within California can call (415) 485-0700.

* * *

A Useful Tool for 32K Users

A handy utility for users of 32K Structured BASIC has been announced by COMPUTIC, SA, of Lugano, Switzerland. Called STAPRO, the software allows users to name any SAVED files they want listed. It will then print all the specified programs without additional "babysitting" by the operator.

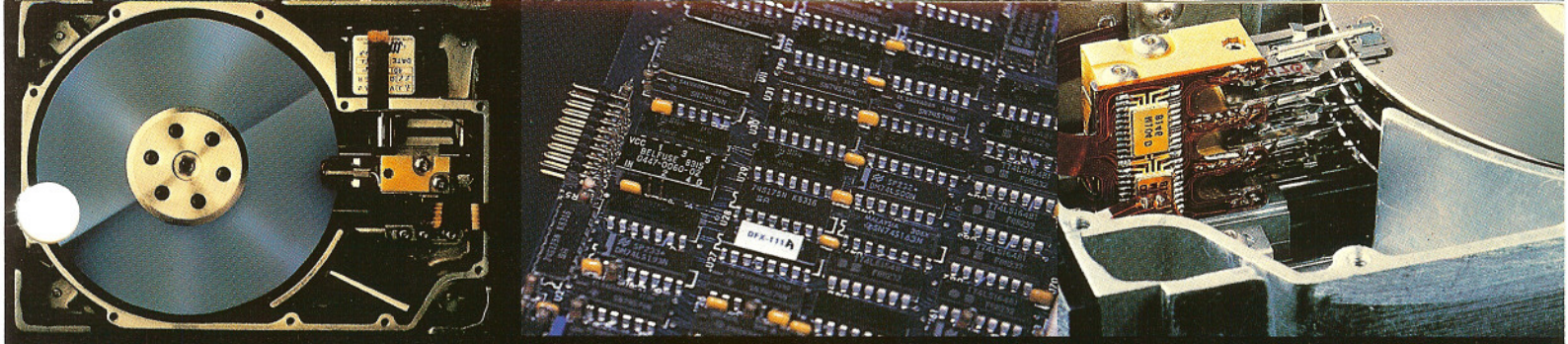
Of particular interest is a feature which allows programs to be loaded without affecting the memory's configuration.

The operator can freely select the desired printing format, even specifying both the horizontal and vertical formats, all with software instructions and without needing any hardware changes to the printer.

STAPRO has many more, very useful features which would be worthwhile for heavy 32K users to explore. For additional information, write:

STAPRO
COMPUTIC, SA
via Marco de Carona 1,
CH-6900 LUGANO
Switzerland

If you wish to order with your inquiry, include $95.00 [U.S.] by International Money Order, Check, or Credit Card Number and expiration date.



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